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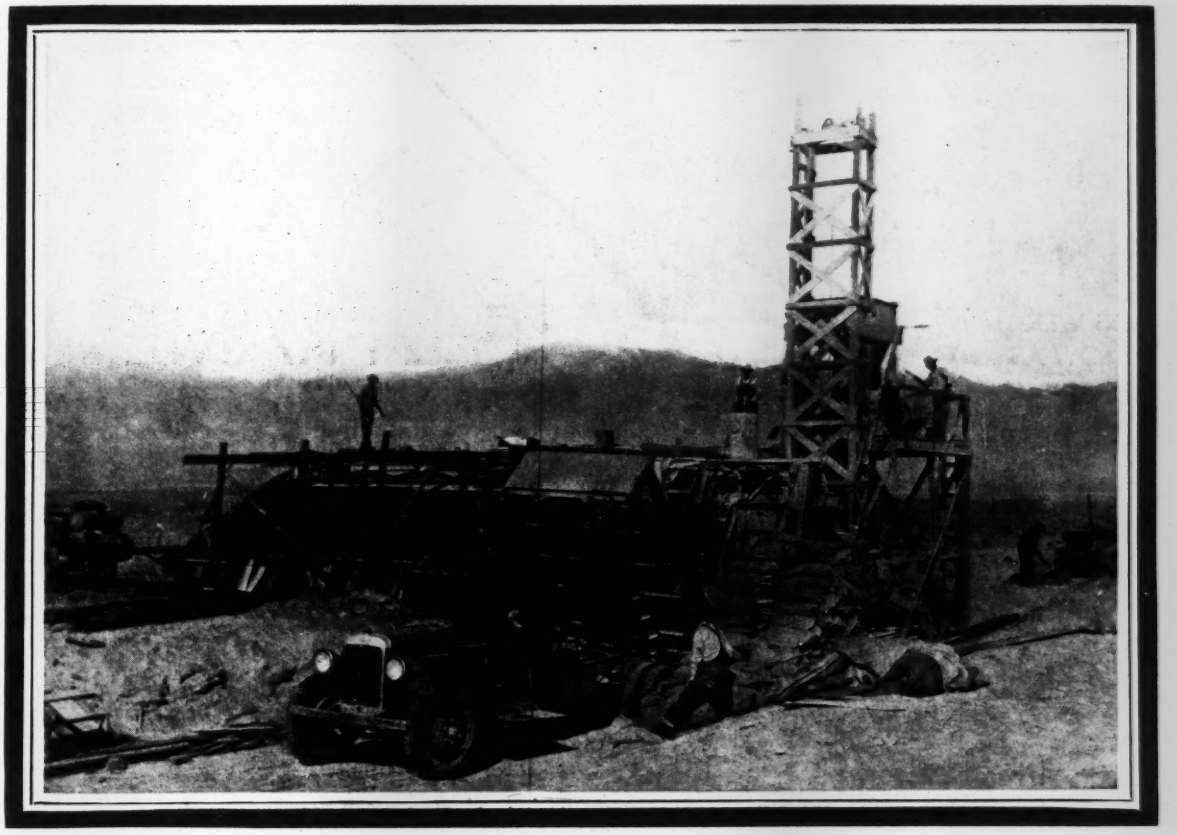

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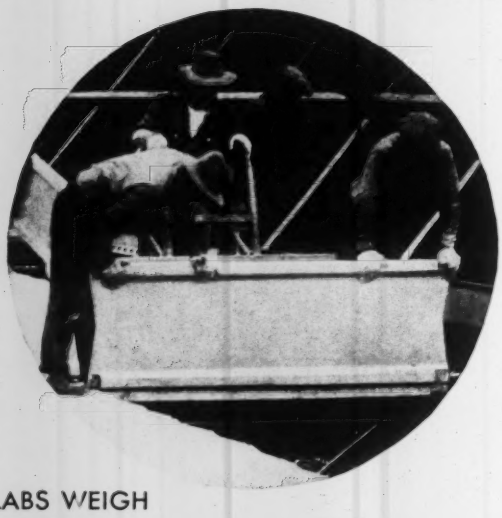

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Contents for November 20, 1930

VOLUME 105, NUMBER 21

Copyright, 1930, by McGraw-Hill Publishing Company, Inc.

New York Subway Construction.....796

Zeolite Water-Softening Plant at Springdale, Pa.....800
By J. F. PIERCE

Naval Ammunition Depot Near Hawthorne, Nev.....803
By C. H. COTTER

Present Trends in Engineering Education.....806
By HARRY TUCKER

Sanitary Engineering and Public Health in Manila.....808
By HAROLD E. BABBITT

Old Wood and Iron Bridge at Vincennes, Ind.....811

San Gabriel Fraud Report.....813

International Acetylene Association Meeting.....814

Editorial...793 Book Reviews...815 Letters...821

News...823 Equipment...829 Unit Prices...831

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DEVOTED TO CIVIL ENGINEERING AND CONTRACTING

F. E. SCHMITT, *Editor*

Volume 105 NEW YORK, NOVEMBER 20, 1930 Number 21

Lanslides in Cities

A GREAT earth-slide disaster at Lyon, France, last Thursday made a new entry in the book of municipal hazards. Unfortunately the published reports are almost bare of mention of the physical conditions surrounding the accident, and no useful lessons can be drawn from it until more facts are brought out. But to reassure any persons who may fear that a similar disaster could happen at their own doors it is to be said that large and sudden slides in cities are extremely rare, and that the chance of a Lyon disaster being repeated elsewhere is correspondingly small. Where a slide risk exists it is generally known, and inspection and precautionary construction can be utilized. Ground that stands in steep hillside formation for a long period of years has a well-demonstrated stability, and is not likely to start moving except when undermined by solution or leaching, loosened by a violent shock as from an earthquake, or subjected to abrupt change in the strength of a supporting stratum by infiltrating water. Of these actions the influence of water on clay or clay-sand strata is much the most frequent; but as the existence of this hazard is almost certain to be known from the history of the locality, it can be dealt with by drainage, supplemented if necessary by retaining-wall protection. A different hazard may arise from disintegrating talus accumulations along steep cliffs, but here also the danger of movement is usually foreseeable. The more common creeping slides, which often produce large property damage, operate by such slow processes that hazard to life is negligible. While slides of cataclysmic type like that of Lyon are rare, they nevertheless emphasize that it is not out of place to give careful study to any abnormal hillside conditions that might make them possible.

Too Many Specialists?

ENGINEERING schools are doing their bit in adding to the ever-increasing number of engineering specialists. In this age of specialization few schools have resisted the temptation to cater to the demand of untrained youths for courses designed to equip them for the particular kind of engineering work they hope to take up when they get out of college. The extent to which this breaking down of the major engineering groups of civil, electrical, mechanical, mining, and chemical engineering into many specialized groups has taken place during the past few years is told elsewhere in this issue. The 71 schools whose catalogs were examined offer a total of 73 courses in their engineering departments. How many of these courses are justified? Are the graduates better able to make their way in life than those more deeply grounded in the fundamentals of engineering and the sciences? Is their field of possible employment broadened or narrowed? Are they more efficient in the early years? Will their intensive training for immediate effectiveness be a help or a hindrance to them in after life? Possibly those and like questions have been answered to the satisfaction of the men responsible. But if the present condition is what it appears to be on the surface, a haphazard development, it is high time that serious consideration were given to its ultimate effects.

Thousands of Tons of Explosives

SOMETHING to stir the imagination lies in the undertaking of building the Hawthorne ammunition depot. One does not often think of the Navy working in the dust of a Nevada desert; such a proceeding seems to belong to stage comedy or the dreams of a restless night rather than to reality. But Hawthorne is intensely real, not only in terms of cubic yards but also in terms of sea-fighting power, for it is the main supply base of the Pacific fleet. The construction of this great new plant evokes memories of the terrible explosion at the Lake Denmark depot in 1926, which demonstrated on a new scale the destructive possibilities that lie in large ammunition storages. That lesson has borne fruit. In the first place, the Navy has gone to a region so remote as to eliminate the hazard to human habitation. In the second place, Hawthorne's reservation area of 180 square miles evidences the care given to assuring public safety. Each unit, moreover, was so placed as to be safe from all others, by segregating the total storage into groups placed two-thirds of a mile apart, and by arranging each group so that no one of its units would influence the others. To make so widespread an arrangement adaptable to good service, with adequate transportation, service and attendance facilities, was no simple task. The Navy had before it the unique problem of providing storage for nearly 6,000 tons of high explosives with a degree of safety equal to that attained in storing amounts a hundred times smaller. In its solution of this problem the Navy made a creditable performance.

Tunnel Lining

LAST week we described an interesting small shield-driven tunnel lined with concrete blocks. Today we record the driving of a larger concrete-block tunnel, which is of unusual interest because it marks the advent of this type of lining into the railroad field. Attempts to find a satisfactory cheaper substitute for cast-iron lining for shield tunnels have long been made. Concrete blocks have often been proposed and sometimes used, but have always been the subject of much controversy. Engineers disagree as to the advisability of using them in various types of ground or in subaqueous work. Some of the questions concerning concrete block lining have been answered by their adoption for the four short sections of subway tube in Brooklyn described in this issue.

Results indicate that all concerned are satisfied with them for the type of ground encountered on this particular project, a dry natural clay and firm filled-in material. How suited this lining is for soft or wet soils is still open to controversy. Conclusions from the successful use of blocks in dry ground will be of value in further discussions. But it is important to note that according to the bids the concrete-block construction was much cheaper than cast-iron construction; and cost is vital to the successful possibility of many tunnel projects.

New Municipal Advance

ORGANIZATION by New York City of a department for planning municipal improvements was accomplished recently as the result of long-continued and often seemingly hopeless discussion. By the final success of the effort it becomes probable that early use will be made of the remarkably far-sighted fundamental study of data carried out during the past seven or eight years by a private organization, the Committee on Regional Plan of New York and Its Environs. Organization of the New York planning department is not of pioneer character, for many cities set up planning bodies years ago and have been operating under their advice since then. But the present event strengthens by a large-scale practical example the arguments of those who are seeking to have organized and officially recognized planning of improvements made a regular municipal function. Moreover, New York is one of the oldest cities of the country, and age increases the urgency and importance of an important class of improvements—namely, those which center on the replacement of old, constricted or haphazard street and building arrangement by modernized facilities. The beginning of studied planning is valuable to New York in many directions: because the city's main entrance thoroughfare system is seriously incomplete, because the city has long had a number of blighted districts which threaten to injure its wealth as well as its working efficiency, because railway, rapid transit, waste removal and many other service problems are simultaneously crowding for a solution and are competing for the available funds, and finally because congestion and taxation are rising up to an importance where they threaten to overshadow all other considerations. Similar problems, equally vital to sound growth and efficient existence, are to be found in every city. Planning, and no other expedient, can make such refractory problems manageable. The imperative necessity of budgeting public improvements for years ahead is coming to the front everywhere; and such budgeting is possible only on the basis of study of data and planning of the required solution.

Say What You Mean!

APPARENTLY, and unfortunately, the resolution passed at the fall meeting of the executive board of the Associated General Contractors asking for a special form of contract for the construction of Boulder Canyon dam did not mean what it said. The resolution itself represents that three specific and two implied reasons necessitated a special contract: the tremendous amount of money involved, the long period of time required for construction, uncertainties in bidding, excessive risk to the contractor, and corresponding excessive cost to the public. These reasons, we hold, are not sufficient cause for the A.G.C. to ask for a special contract in the face of the organization's long fight to have contractors receive proper recognition. Therefore we asked editorially on Oct. 23 whether contractors are "losing nerve." But now come two organs of the A.G.C., the *Constructor* and the *Pacific Constructor*, to say that the resolution meant what it did not say: that the government's standard form of contract is objectionable in this particular instance because it is subject to various interpretations. If these journals are right, why did not the resolution say what it meant? The *Pacific Constructor* in fact asks this very question. How the resolution is interpreted by others may be judged from an editorial in the New Orleans *Times-Picayune* of Oct. 22, headed "Beware of Cost Plus"; the editorial assumes that this is what the contractors wanted. But if under the new semi-official interpretation of the resolution the government standard contract is unsuited to Boulder dam because of possible misinterpretation, it is equally unsuited to every project, and the A.G.C. might properly direct its energies to having it revised for all needs. Or else it might seek to determine when the standard form is suitable, and whether size of project, nature of work, or the fact that it comes under a certain department of the government is the essential criterion for abandoning the standard and requiring a special form of contract.

Punish the False Accusers

IT IS a satisfaction to report that a competent investigating board has exonerated E. C. Eaton, engineer of the Los Angeles County Flood Control District, of the ugly charge of fraud laid against him several months ago by a Los Angeles newspaper with the help and support of certain local engineers. Eaton had the duty of arranging a settlement with the contractor for the ill-fated San Gabriel Forks dam after the work was abandoned because of bad foundation rock, when many hundred thousand cubic yards had already been excavated; in performing this duty, the accusers charged, he overestimated the work done to the extent of a quarter million cubic yards and caused the contractor to be paid nearly a million dollars too much, thus looting the public treasury of that amount. The investigators find that there is not a shadow of truth to the charge; Eaton's survey was correct and the payment to the contractor fair and proper.

But this finding, gratifying as it is, does not close the case. The charge now recoils on the false accusers, and the civil engineering profession has work to do in bringing them to bar. The newspaper which published the charges is presumably subject to the penalties of the civil and criminal law. The offense of the engineers who fomented and fed the charges, however, goes beyond the power of the lay courts to punish adequately. Their greater crime is against the engineering profession, whose good repute they have brought to shame.

The local engineering group has the responsibility for initial action. It faces formidable difficulties in tracing the course of the covert attack, but the group is composed of strong and high-principled men and may be relied on to carry out the duty of conducting a searching and fair trial and spreading its verdict upon the public record. Thereafter the responsibility for action devolves upon the licensing authorities and the national societies. Until the traducers of the good name of engineers are publicly branded and cast out of the fellowship of engineers there remains a blot on the honor of the profession.

Their Heads in the Sand

ENGINEERS often are charged with being unpractical, too deeply absorbed in the contemplation of abstract theories to concern themselves with the actual working out of their theories or to care whether the theories have any real application. A good example which tends to support this charge is the recent action of the board of directors of the American Institute of Mining and Metallurgical Engineers on the licensing of engineers, action which has just come to notice in connection with the organization of a joint committee on revision of the license law in New York State.

Last winter the board, after a restudy of the matter of licensing, reaffirmed the attitude which it took back in 1922. It sees no necessity for licensing engineers in its field, and as a consequence it hopes that local members when consulted in regard to license laws will urge that mining engineers and metallurgists be exempted from such laws. In other words, the board, following the lead of the ostrich, having in 1922 stuck its head in the sand, decides in 1930 to keep it there, trusting to Providence that the same agency which kept it from losing its wings last winter will keep it from losing its neck the next time that licensing matters are tossed up and blown about in the winds of legislation.

The agency which last winter kept the mining profession from losing its wings in the legislative storm in New York State was a joint committee of the other engineering professions. At that time there developed a concerted attempt to write a citizenship requirement into the engineers' license law. The civil, electrical and mechanical engineers saw in this citizenship requirement the risk of retaliatory legislation in other countries. If this country refuses to let foreign engineers practice here, other nations will be quick to set up a similar restriction against American engineers. And who is more deeply interested in pushing his quest for work into foreign fields than the mining engineer! But is the board of directors of the mining institute interested in keeping a license law from becoming a potential source of restriction upon the freedom of its members? Of course not. The board believes the licensing of engineers to be wrong *in theory*. It cannot, therefore, consistently take any action upon a license law which has gone beyond the theoretical stage and become an *actuality*. Other engineers may discard their theories in the face of realities, but not the board of directors of the American Institute of Mining and Metallurgical Engineers!

The case of the board of the mining institute is cited here because it is the most outstanding example of a not uncommon attitude of mind. Other branches of the engineering profession are well supplied with individuals who similarly choose to imitate the ostrich when licensing looms up on their horizon. They did not favor licensing when it was under discussion as a theoretical consideration and so they refuse to take any hand in improving license laws which have since been written upon the statute books of many of our states despite their protestations. As a result, the burden of eliminating the faults which exist in almost all of our state license laws has fallen upon the shoulders of a few men. They need and would welcome the counsel of their fellows. Moreover, because of this apathy on the part of a large number of engineers, little thought is being given to the broader questions which license laws have raised. For example, little consideration is being given to whether blanket licensing of all engineers under one title is necessary, or whether the demands of public safety would be adequately satisfied by the licensing of only those engineers whose work directly affects the public safety. This and like matters need the thoughtful consideration of men who are willing to study the actual working out of license laws. They never will be properly considered so long as many engineers prefer to keep their heads buried in the sand.

A Study Only Begun

ABNORMAL low water in large regions of this country, floods at a few widely separated points, or even hail and wind storms, these extreme conditions mark the past few months. Man has no means of predicting or anticipating any of them; they come now as they always have come, unpredicted and uncontrolled.

For years men have gathered and correlated statistics of weather, rainfall and runoff in vain efforts to anticipate what nature will provide in the way of future water supplies. Mass diagrams of runoff figures have been prepared and probability curves computed in order to determine how frequently we may expect periods of heavy rain or drought in a particular region—only to be set at naught by a quickly recurring drought of abnormal magnitude or a flood greater than any previously recorded. The season's manifestations, like the Florida hurricanes or the Mississippi flood of recent years, have been of that character; they tend to discourage the careful toiler who has hoped to make good use of his amassed statistics.

But despite all erratic phenomena, his work has not been in vain. Already he knows more than his forbears about the peculiarities of his region and its streams and so can take better advantage of them. He knows what auxiliary storage facilities can be justified economically. If this were all we may ever expect to gain from our study of storms and rainfall and streamflow it would still be enough to repay the effort of the long observations and comparisons. It is not all, however. The weather constitutes so vast a field, as events teach us more and more surely, that its study has little more than begun.

Let the gathering of data continue and be much intensified in its pace. The power of weather over the well-being of mankind is so enormous that efforts far beyond any yet applied to the work are justified. Who will say that, as its study becomes more general throughout the world, we may not gain knowledge of worldwide conditions which will show system in the apparently erratic manifestations of nature? We may discover a connection between drought in one continent and heavy rains in another. We may even trace the causes of rain and wind far enough to understand something of the mechanism of seasonal and cyclic changes.

Only a vanishingly short segment of the weather curve has yet been explored. On the scattering, short-time data so far gathered men of courage have undertaken to develop laborious analyses and draw conclusions sometimes extending hundreds and thousands of years beyond our knowledge. But these attempts, proof of the boldness and determination of investigators, mean neither that weather study is fruitless nor that the accumulation of data has gone as far as the possibilities justify. On the contrary, if rightly seen they teach very plainly the lesson that we need renewed interest, renewed intensity of study and that weather and wind and streamflow are worthy of a greatly increased organization of data gathering. The world's labors in weather study, age old though they be, have only begun.

New York Subway Construction—IV

Shield Tunnels With Precast-Concrete Block Lining

Concrete Blocks With Interlocking Lugs Used in Short Length of Four-Tube Structure Shield-Driven Through Dry Ground in Normal Air Pressure in Brooklyn—Special Lining Erectors, Block-Casting Equipment and Grouting Procedure Developed

TUNNEL sections of the New York subways in earth are for the most part subaqueous tunnels under the East River and their land approaches. They have been shield-driven tunnels with segmental cast-iron lining. In the under-river tunnels of the third subway system this construction type is maintained, but in building a short section of land tunnel in Brooklyn a departure was made. These tunnels are driven by shield in the ordinary manner, but a segmental, precast-concrete block lining replaces the cast-iron lining invariably used in the past. As this lining is an innovation in subway construction, and as notably ingenious construction equipment and procedure have been worked out, a separate article and full description are devoted to the tunnels on which they are used.

—EDITOR.

PRECAST-CONCRETE blocks are being used for lining shield-driven subway tunnels from Prospect Park to Prospect Ave. and Terrace Place in Brooklyn. As shown by Fig. 1, two of the tunnels are for express tracks and cut diagonally across streets and private property, and two are for local tracks and are largely under streets; all four tunnels converge in Prospect Ave. at Terrace Place. Although in firm material and above groundwater level, shield construction was specified for both local and express tunnels; but because only a few buildings were on the short stretch of local tracks through private property, alternate plans were prepared for their construction as structural-steel subway in open cut.

The use of precast-block or monolithic concrete, at the option of the contractor, was specified as an alternate to cast-iron segments to determine if a lining could be secured that would be cheaper than, but as desirable as, cast-iron lining for shield-driven tunnels. (See *Engineering News-Record*, Aug. 3, 1922, p. 175.) Comparison was also desired with bids for open-cut construction.

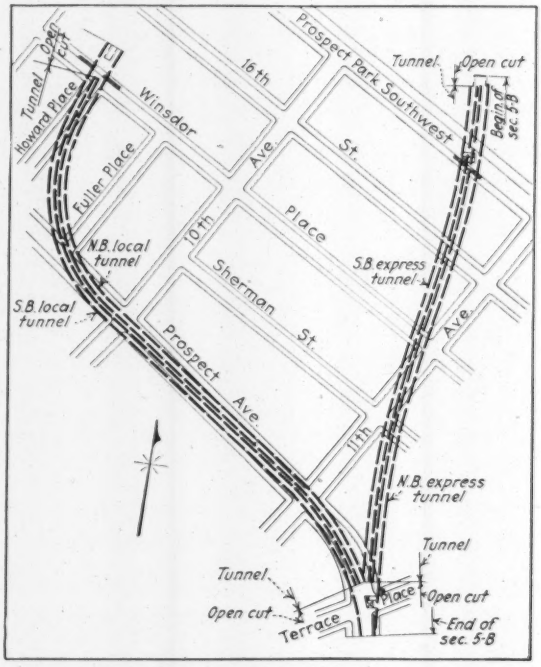


FIG. 1—MAP OF SECTION 5B, ROUTE 109, NEW YORK SUBWAYS

The work was advertised for four alternative plans, on each one of which the bidders were required to tender. Briefly, the plans were: branch No. 1 for express tracks under Prospect Park, occupying private property and cross streets, to Terrace Place, to be either concrete or cast-iron shield-driven tunnels; branch No. 2 for local tracks under private property, Howard Place, Prospect Ave. and cross streets, to Terrace Place, to be concrete or cast-iron shield tunnels without removal of buildings overhead; or structural-steel subway in trench, buildings overhead to be removed. An analysis of the bids received is given in Table I.

The contract for concrete-lined shield tunnels was awarded Oct. 17, 1928, to the Cornell Contracting Corp., which arranged with John F. O'Rourke to use his system of reinforced-concrete block lining, erection

TABLE I— COMPARISON OF ALTERNATE BIDS

Alternate 1a, local and express tracks in concrete tunnels.
Alternate 1b, local and express tracks in cast-iron tunnels.
Alternate 2a, express tracks in concrete tunnels. Local tracks in structural-steel subway.
Alternate 2b, express tracks in cast-iron tunnels. Local tracks in structural-steel subway.

Summary of Total Bids

	Cornell	O'Rourke	Hart & Early	J.F. Cogan	McGovern	Corson
1a	2,974,884	3,086,733	3,274,383	3,722,859	3,711,364	4,157,062
1b	4,538,934	4,303,483	4,038,283	4,244,209	4,867,904	4,713,062
2a	3,985,231	3,619,676	3,602,816	3,967,153	4,284,738	3,972,799
2b	4,680,631	4,006,676	3,963,976	4,198,953	4,741,378	4,219,999

Various Lowest Bids Compared

Lowest bid, 1b	$4,038,283
Lowest bid, 1a	2,974,884
Difference, favor of 1a	1,063,399
Lowest bid, 2a	3,602,816
Lowest bid, 1a	2,974,884
Difference, favor of 1a	627,932
Lowest bid, 2b	3,963,976
Lowest bid, 1a	2,974,884
	989,092

Linear-Foot Prices for Shield-Tunnel Items Only

Item 148-I, shield tunnels of monolithic concrete or reinforced-concrete blocks.
Item 148-J, shield tunnels of cast-iron segments lined with concrete.

	Cornell	O'Rourke	Hart & Early	J. F. Cogan	McGovern	Corson
Alternate 1 6,930 lin.ft.						
Item 148-I, per ft.	$325	$300	$370	$425	$410	$490
Item 148-J, per ft.	550	475	480	500	568	570
Difference per ft., favor of concrete	225	175	110	75	158	80
Alternate 2 3,080 lin.ft.						
Item 148-I, per ft.	325	375	403	425	385	495
Item 148-J, per ft.	550	500	520	500	533	575
Difference per ft., favor of concrete	225	125	117	75	148	80

apparatus and gravel packing. He was also given a subcontract to manufacture the concrete blocks and was appointed consulting engineer for the contractor.

Design of Lining Blocks

On tangents the lining consists of rings of ten standard blocks, each block 6 ft. 1 in. long on the chord of the outside arc, 18 in. thick and 30 in. wide, forming a tube 16 ft. 9 in. inside diameter and 19 ft. 9 in. outside diameter. The blocks contain 0.8 cu.yd. of concrete each and weigh 3,200 lb. Curve alignment is taken care of by tapered rings, narrowing by 3.4 in., $1\frac{3}{8}$ in. or $2\frac{3}{4}$ in., in precisely the same manner as cast-iron taper rings. Using these three different taper rings in combination with standard rings in proper proportion gives any desired curvature of tunnel. Details of the blocks and a section and elevation of completed rings are shown by Fig. 2.

Each block has two $1\frac{1}{2}$-in. lugs on one side and two $1\frac{1}{4}$-in. recesses on the other. Corresponding lugs and recesses of adjoining rings fit loosely together, the lugs and recesses being so spaced that the blocks break joint longitudinally. Two mats of five $\frac{3}{8}$-in. reinforcing rods with welded crossbars are placed in each block 2 in. inside the lug and recess faces. A hole is cast entirely through each block for the injection of pea gravel outside the lining in the space left by the shell of the shield. Grout holes turning from the inside face of the blocks into the ring joints between the lugs are used in one-third of the blocks for the purpose of grouting the joints. All holes are cast with threads ($1\frac{7}{8}$-in. diameter, $\frac{3}{8}$-in. pitch, trapezoidal) for attaching grout and gravel pipes. Two erector grip holes, cast on the inside face of each block, receive tongs for handling and hoisting the blocks and the grips of the erector arm for setting up the rings. These holes are also used to support the steel rails on which the wheels of the erector platform are carried. It is interesting to note that this brings a load of 10 tons at times on each of these holes and that there has never yet been a failure.

Driving Tunnels and Erecting Lining

Two shields were employed for driving the four tunnels. They were used first in the lower or express tubes and then in the upper or local tubes, driving from the Prospect Ave. or east end, where the tunnels converge. After completing the express tunnels to the shaft in Prospect Park, the shields, weighing 142 tons, were jacked intact up the shaft to the surface, lowered onto a 150-ton trailer, and hauled to the starting point at Prospect Ave. and Terrace Place. Here they were lowered down another shaft to the level of the tunnels for

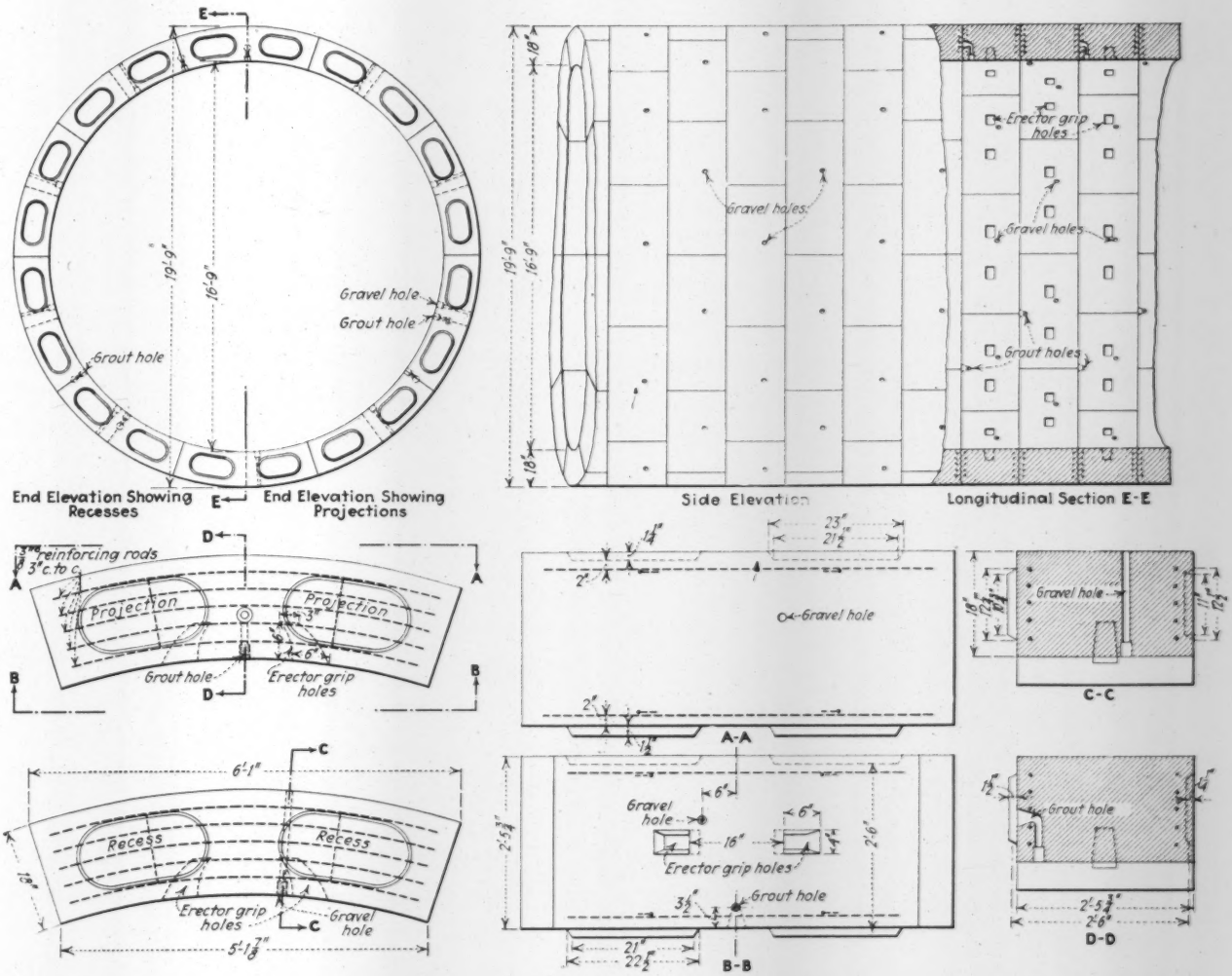


FIG. 2—DETAILS OF CONCRETE BLOCKS

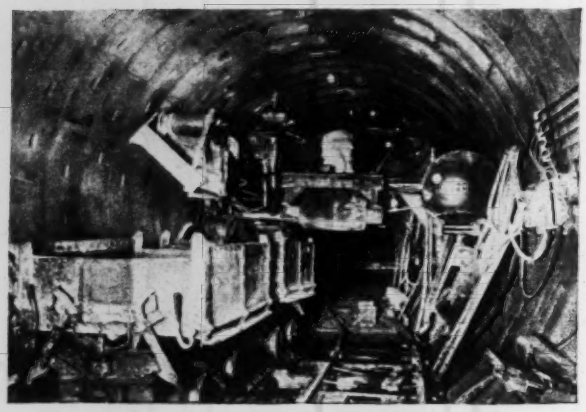


FIG. 3—REAR VIEW OF ERECTOR TRAVELER, SHOWING BELT CONVEYOR LOADING FROM SHIELD TO MUCK CARS

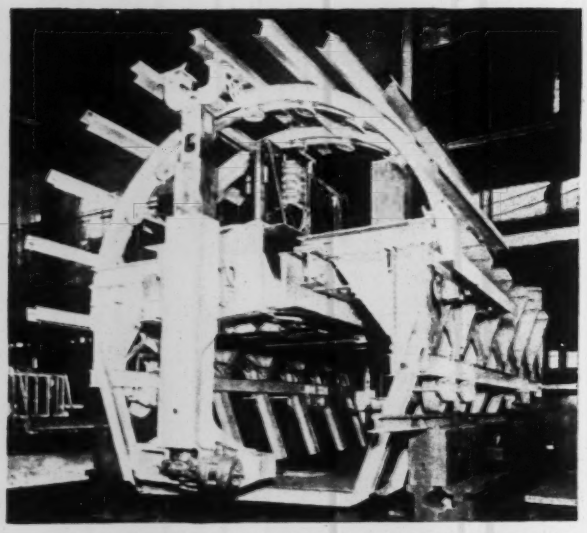


FIG. 4—FRONT VIEW OF ERECTOR TRAVELER TAKEN IN SHOP

Note electric-operated erector arm and adjustable I-beams used to hold arch blocks temporarily in place until a ring is completed.

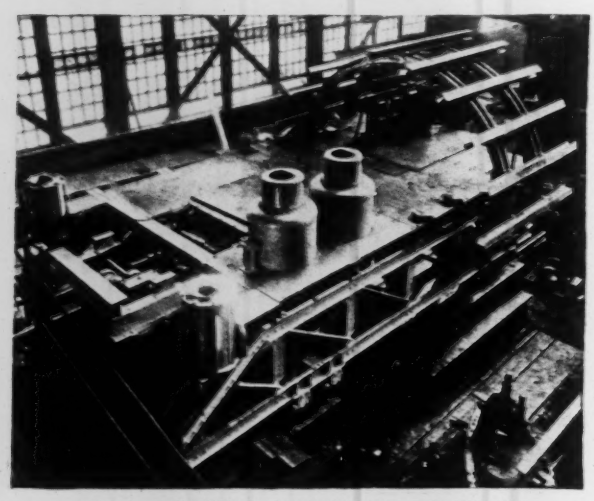


FIG. 5—TOP VIEW OF ERECTOR TRAVELER TAKEN IN SHOP

Two gravel-shooting guns are shown on top of traveler platform. Two grout guns are at rear end of traveler.

the local tracks (*Engineering News-Record*, March 27, 1930, p. 530). The shields are of the conventional type, 20 ft. 5 in. outside diameter, with cast-steel cutting edge and hood.

Twenty 8-in. hydraulic jacks, spaced to center on lugs and recesses, shoved the shields ahead. Three hydraulic pumps develop up to 5,000 lb. pressure, which makes the maximum jack pressure 125 tons. The jacks shove against wooden blocks fastened to their ends, which fit into the recesses of the blocks so as to distribute the pressures evenly over the faces. The areas of the ends of the lugs are proportioned to limit the maximum jack pressure to 1,250 lb. per square inch. Quite a few of the blocks were cracked by the thrust of the shield jacks, the cracking occurring almost always in the second ring behind the shield. As the cracks were mostly in a radial direction and did not impair the arch action of the block rings, only a few blocks had to be removed.

Most of the material encountered is a fine sand or a firm clay. Breast boards are used at the face of the headings to prevent loss of ground. Occasionally the tunnels pass through old fills of sand and gravel, sometimes containing all sorts of debris. The muck is thrown onto steel plates laid in the tail of the shield connecting to the lower deck of the erector platform and is then recast upon a conveyor belt (Fig. 3) in the side of the lower passageway in the erector, which discharges it into muck cars. Storage-battery locomotives haul the cars to the shaft.

The blocks are brought from the shaft to the shield on flat cars and are erected within the tail of the shield by a specially designed erector, ring by ring. Usually in shield tunnels the erector consists of a hydraulically operated arm connected to the shield. On this job the erectors are electrically operated and are located on independent traveling platforms (Fig. 3 to 6). These erectors have a longitudinal travel of 7 ft. forward and back on the platform, and the erector arm has a radial extension of 5½ ft.

The erector picks up a block directly from the cars, a procedure not possible with the usual type of erector. After picking up a block the erector is moved forward to the ring and the block is set in approximate position. Two semi-circular steel arches on the forward end of the traveler platform carry eleven movable horizontal I-beams which support the blocks above spring line at their middle and longitudinal joints. The beams are manipulated radially by screw jacks and are moved longitudinally by hand. The erector moves the block to its approximate position slightly above the arch of the ring. Then two of the beams are moved forward under the block, which when lowered by the erector onto the beams is held flush with the inner surface of the tunnel. The block is then moved back into final position, the lugs fitting into the recesses of the previous ring and the lower longitudinal face resting against two corrugated shims which are described later.

For the closing or key block, a structural-steel segment, shorter than the space between the movable beams supporting adjoining blocks, except its outer 6 in., which is of the standard length, is pushed up through the space between the movable bars so that the full-length part is forward of the ring, and is backed into place and wedged temporarily to complete the ring. After the shield is shoved ahead and space is thereby provided for the next ring, this steel block is removed and a standard concrete block is backed into place to close the ring before the next ring is started.

Two ¼-in. shims of $\frac{1}{16}$-in. corrugated steel plate 2 in. wide are placed in each longitudinal joint as the blocks are erected, which permits free flow of grout along the joint and gives immediate arch strength to the ring. Tests have shown that these shims require 200 tons pressure to flatten them. A strip of felt is placed in the outside joints of the rings to exclude gravel packing and surrounding ground from the joints between the blocks. All joints in the inner face of the tunnels are pointed as the rings are erected and in 24 hours are set hard enough to resist the pressure of grouting the joints. The joints between rings of every fourth ring are pointed to confine the grouting to 10 ft. of tunnel at a time, otherwise the grouting would push forward and force out the freshly pointed joints.

Gravel shooting and grouting are both done from the traveler carrying the erector. Pea gravel is blown through the gravel holes with 100 lb. air pressure as the shield moves forward, the graveling being done through the third from the last ring, as the last two rings are always within the tail of the shield. The purpose of the gravel is to fill in the annular space surrounding the tunnel left by the tail of the shield and thus prevent as much as possible the settlement of earth against the outside of the block lining, with resulting settlement of ground overhead, substructures or adjacent buildings. Grout is forced to refusal through the grout holes about ten rings back of the last ring placed. The grout not only fills in all the joints between the blocks, but also works out through the gravel packing and forms in lumps in the ground surrounding the tube, which compacts the ground.

A general progress of six rings or 15 ft. of tunnel per day is maintained in each heading, using three 8-hour shifts. The grouting is completed the next day following erection, after all joints are pointed up. The completed lining presents a neat, smooth and solid appearance (Fig. 7). A concrete floor is being poured in the express tunnels for the track base, and duct banks will soon be installed similar to those in cast-iron tunnel.

About 28,000 blocks are required for the job. These were made at a plant in Flushing, Long Island. All materials are delivered to the plant in barges. A 1:2:4 concrete of sand and gravel aggregates is used for the blocks, the concrete being mixed a full two minutes.

FIG. 7—COMPLETED SECTION OF CONCRETE BLOCK LINING

FIG. 8—STORAGE YARD AT BLOCK PLANT SHOWING TWO TRAINS OF CARS READY FOR SIDE FORMS

The blocks are cast in individual forms of machined steel plates seated on accurately machined cast-steel bases. Each form bottom is mounted on a 2-ft. gage car, shown in Figs. 8 and 9. These bottom panels, in which is cast the lug face of the block, are integral with the cars, while the other panels are removable. The panels are fastened together by pins in chrome-steel bushed holes with screw clamps adjoining the pins. Use of the chrome-steel bushings prevents enlargement of the holes by the pins, so that the forms retain their original dimensions exactly, despite constant use.

A total of 180 cars with bottom panels is used, with 60 complete sets of upper parts of forms. Cores for erector grip, grout and gravel holes are fastened to the side or arc panels, except a truncated cone which is fastened on the bottom panel to make an opening for the grout holes into the ring joints.

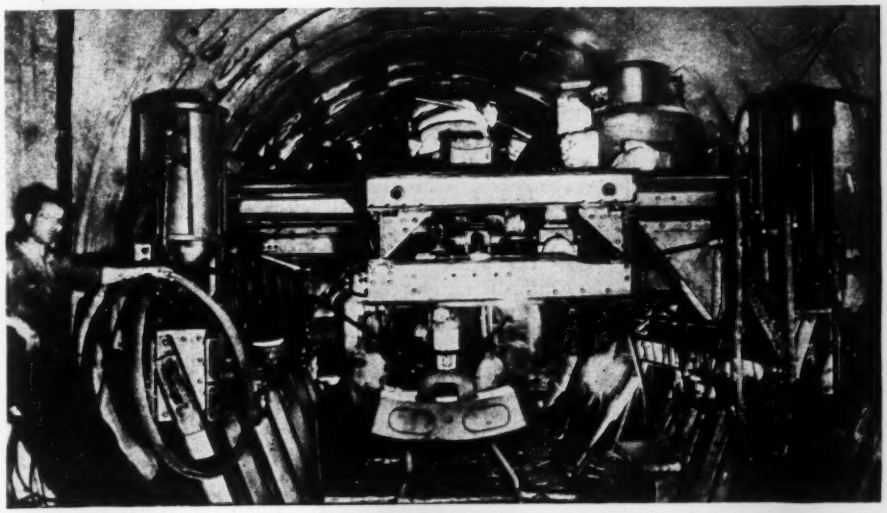


FIG. 6—REAR VIEW OF ERECTOR TRAVELER AT START OF TUNNEL
Erector arm is holding a block ready to place.

The recesses are formed by top cores forced into the concrete and supported on the side plates soon after the block is poured. Bottom reinforcing mats are placed before pouring, two welded crossbars being turned down at the ends to keep the bars 2 in. from the joint. The top reinforcing mats are forced into the concrete the proper depth before the recess cores are placed. Taper blocks are made by adjusting the position and angle of recess cores and placing shims between the cross angles and the recess core.

The pouring cycle was as follows: A train of 30 car molds was poured successively and then run into a heated molding shed, where the side and top forms were stripped after six hours. A train of 30 empty car trucks with the bottom form panels was on an adjacent track and the forms were erected on these cars as they were stripped from the blocks of the adjoining train. As soon as the forms on this train were set up they were cleaned,

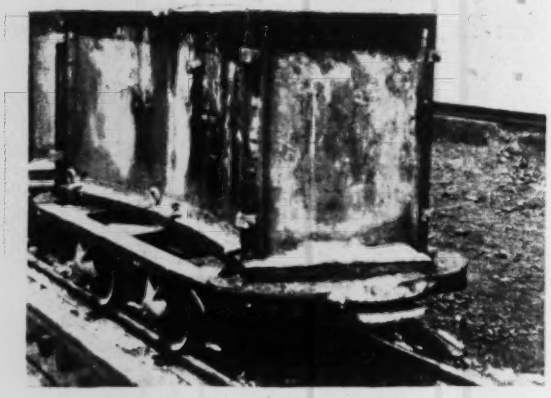


FIG. 9—FORM CAR ASSEMBLED READY FOR CONCRETE

oiled, and then hauled to the mixer and filled, after which the recess cores were placed. The blocks then set until the next shift stripped them as before. Concrete was poured in two shifts per day, 60 blocks being completed each shift.

Twenty-four hours after pouring, the cars were run out into a storage yard and the blocks hoisted to storage piles, where they cured at least thirty days before erection. A gantry crane hoisted the blocks from the cars to the storage piles, and later loaded them on trucks for transportation to the job. The blocks were handled by tongs which fit into the erector grip holes on one side, friction holding the other arm. Oil used on the forms never showed on the surface of the blocks.

The concrete plant consisted of an inundator, a 1-cu.yd. mixer, and storage bins capable of holding sufficient material for 30 blocks, charged by a stiff-leg derrick with a clamshell bucket from a barge of gravel and sand alongside the bulkhead. Concrete was dumped from the mixer into a hopper beneath which the train of forms passed. As each batch was dumped into the hopper another batch was ready to dump into the mixer. The mixing operation was continuous and the filling of molds went on without interruption until the entire train was filled. Three men were employed in spading the concrete in the molds as the filling proceeded. At first an attempt was made to vibrate the forms as the molds were being filled, but investigation showed that this method was not distributing the aggregates into the corners and recesses as satisfactorily as the spading.

Personnel—The tunnels are part of the new city-owned subway system being built by the board of transportation under the direction of Robert Ridgway, chief engineer. Col. J. R. Slattery is deputy chief engineer in charge of construction. J. O. Shipman is division engineer, C. E. Thomson is assistant division engineer, and W. Stuart is section engineer on the work for the city. The Cornell Contracting Co. has the contract, the work being directed by E. A. Herrick, vice-president, and S. Kent, chief engineer. John F. O'Rourke, New York, designed the blocks, molds, electric erectors, platforms, and movable beams, and J. & I. O'Rourke are subcontractors for manufacturing the concrete blocks.

Zeolite Water-Softening Plant Installed at Springdale, Pa.

Municipally Owned Plant Financed by Revenue Bonds — Split Treatment Produces Slightly Hard Effluent

By J. F. Pierce

Water-Works Engineer, American & Foreign Power & Light, Havana, Cuba

The use of zeolite water-softening units in the municipal water-treatment plant at Springdale, Pa., has resulted in reducing the hardness of the well water delivered to the consumer from about 20 grains to 4 grains per gallon. Part of the supply is treated so as to produce water of zero hardness and is then mixed with the remainder, so as to obtain water of sufficient hardness to be satisfactory for household uses. The two units, having a combined capacity of 610,000 gal. per day, were placed in operation in October, 1929. —Editor.

Zeolite water-softening units have been used in industrial plants and laundries over a long period of years. But it has been a comparatively recent and short period of time that they have been installed in municipal plants for softening the water. Information, especially in technical publications, is meager regarding the design, application and the results obtained from the base-exchange method of water softening for municipal supplies.

Zeolite mineral is available in two forms, natural and synthetic; the former appearing as green sand, or clauconite. There are several synthetic zeolites on the market, all of which are covered by patents. The important characteristic of this mineral, in either form, is the power it has of removing the hardness-forming elements as the water flows through it. Not all hard water can be softened successfully by the base-exchange method, however. It must be free from suspended matter, oil, or anything of similar nature that has a tendency to "seal" the porous material.

The demand for soft water became apparent some years ago in the borough of Springdale, Pa., where the water used for domestic purposes had a hardness of 20 grains. A bond issue, in 1921, for the construction of a softening plant, however, did not meet with the approval of the majority of the voters. But the agitation would not be downed, and in 1926 the town council again took up the problem. It was proposed by the local governing body to issue bonds directly against the

TABLE I—CHARACTERISTIC ANALYSES OF SPRINGDALE RAW WATER

	7/22/19	9/30/19	8/31/20	3/18/26	3/18/26	7/22/26	2/5/28	4/13/28	11/19/28	2/23/28
Turbidity	0	0	0	0	0	30	0	1	...	5
Color	10	10	5	5	5	Slightly yellow	3	0	...	0
Alkalinity	260	245	250	245	243	200	241	247	...	260
Total hardness	240	220	190	308	336	309	368	336	284	330
Temporary hardness	240	220	190	245	243	...	241	222	231	...
Permanent hardness	0	0	0	63	93	...	127	14	53	
Chlorine	74	87	95	37	37		52	...	...	
Iron	Trace	Trace	Trace	0.1	0.1	Trace	0.05	0	...	0

TABLE II—PROPOSALS FOR FURNISHING SOFTENING EQUIPMENT TO THE BOROUGH OF SPRINGDALE, PA.
Received March, 1928

Bidder	A	B	C	D
Size of units	7-ft. dia.	9x16 ft.	9 ft. x 20 ft. 1 in.	9 ft. x 16 ft. 10 in
Vertical or horizontal	Vertical	Horizontal	Horizontal	Horizontal
No. of units required	2	3	2	2
Rate of flow, g.p.m. per sq.ft. of area	5.2	5.5	1.5	4.8
Depth of mineral, in.	75	40	53	100
Salt consumption per 1,000 grains of hardness, lb.	0.38	0.50	0.50	0.50
Max. head water required, ft.	15	20	23	70
Effective size mineral, mm.	0.39	0.285	0.30	0.25
Exchange value of mineral, grains of $CaCo_3$ per cubic foot	6,500	2,800	2,300	3,000
Uniformity coefficient	1.8	1.7	1.65	1.60
Time required to regenerate, min.	35	25	30	30
Water required for regenerating unit, gal.	3,840	9,000	7,500	...
Salt required per 1,000 gal., lb.	8.2	10.8	10.8	11
Capacity each unit per 24 hr. for 4 gr. water, gal.	305,100	319,000	310,000	310,000

TABLE III—ANALYSES OF RAW AND SOFTENED WATER, COLLECTED NOV. 8, 1929

	Well No. 3	Soft Water Reservoir
Turbidity	0	0
Color	0	0
Odor	0	0
Taste	0	0
Hydrogen ion concentration (pH value)	7.0	7.3
Alkalinity, p.p.m.	244	229
Apparent hardness (soap test)	348	12
Total hardness (calculated from analyses)	379	15
Temporary hardness	244	15
Permanent hardness	135	0
Free carbon dioxide	31	18
Chlorides as chlorine	44	43
Total iron	0	0
Nitrogen as:		
Free ammonia	0.034	0.028
Albuminoid ammonia	0.030	0.030
Nitrites	0.006	0.004
Nitrates	2.3	2.0
Total solids	552	504
Silica (SiO_2)	13.4	14.2
Iron oxide (Fe_2O_3)	0.0	0.0
Aluminum oxide (Al_2O_3)	1.4	1.5
Calcium oxide (lime, CaO)	168.4	6.9
Magnesium oxide (magnesia MgO)	31.4	2.7
Sulphuric anhydride (sulphate SO_3)	105.1	91.4

municipally owned plant, the same as though it were privately owned. The earnings of the plant were to be pledged for the payment of the interest and sinking-fund charges of the bonds. By this method the general bonded indebtedness of the community would not be increased.

Two important legal questions were raised when this method of financing was proposed. First, was the enabling act constitutional? Second, was the act broad enough to cover improvements to a plant already in operation and which had originally been built by the municipality?

No record was found in any of the legal digests where the first question was ever presented to the state supreme court. Several municipal bonding attorneys were consulted. It was their personal opinion that the act was constitutional and that the bonds could be safely issued and sold, but because the act had not been tested in court they hesitated to certify to the legality of a bond issue whose interest and sinking-fund payments were to be met from the earnings of a municipally owned plant.

The firm convictions of the municipal authorities as to the legality of the issue, accompanied by their enthusiasm to provide soft water to the community, eventually overcame all obstacles. The state department of internal affairs approved the bond issue, the bonds were sold at a 4½ per cent interest rate, and the money became available in the spring of 1929.

In the summer of 1927 the writer had made an investigation of the problem of softening the municipal supply. The analysis of the water, over a period of ten years, showed a temporary hardness varying from 190 to 368 p.p.m. and a permanent hardness varying from 0 to 127 p.p.m. (Table I). Only one analysis showed any signs of turbidity. At no time was there more than a trace of iron present. Softening by the zeolite method was recommended due to: (1) the character of the water; (2) simplicity of plant operation; (3) low operating cost, as no additional trained operator would be needed; and (4) the flexibility of the system. The town council accepted the report, and plans and specifications were prepared.

That there is a wide divergence in the size of the units, capacity of mineral, etc., in the equipment of the various makes on the market is apparent from Table II. This table has been compiled from a questionnaire sent to the various companies for information on the cost

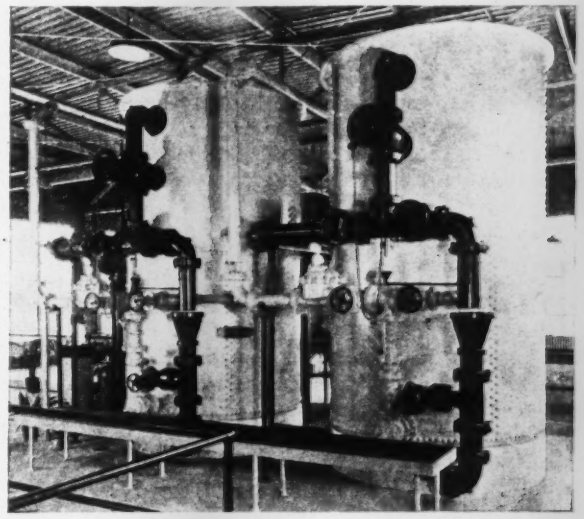


FIG. 1—TWO VERTICAL SOFTENER UNITS PRODUCE 610,000 GAL. PER DAY

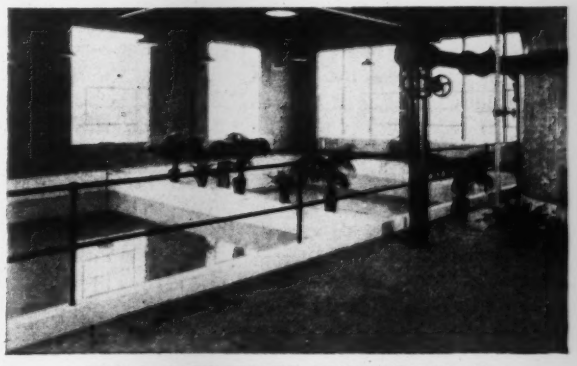


FIG. 2—SOFT-WATER STORAGE BASINS

of equipment to soften a water that has a hardness of 22 grains calcium carbonate equivalent, at a rate of 400 g.p.m.

The best installation would be the one whose mineral had the highest exchange value with the lowest salt consumption and which required the minimum head of water to operate efficiently with the least amount of water needed for regeneration. There is also to be taken into consideration the size and weight of the units, especially if the installation is to be in a building already constructed.

In the equipment selected the flow of water is upward during softening, regenerating and washing. The rate of flow per square foot of area for softening is 6 gal. per min., and the rate for regenerating and washing varies from 4 to 8 gal. per min.

The hard water is pumped from wells into an elevated iron tank of 20,000-gal. capacity, located near the softeners. The tank furnishes a constant flow of water to the units by gravity and removes the possibility of "surging" of the mineral, which might take place if the water were pumped directly from the wells. This tank was elevated at a height that would provide sufficient head to operate the units but which would not create sufficient head to cause the loss of the mineral through the overflow pipes should the operator become careless.

After passing through a meter, the hard water enters the softening units at the bottom through a manifold system equipped with distribution nozzles. The flow is upward through a filter of gravel of various sizes for 12 in., and is then continued upward through the softening mineral. The soft water is collected at the top and discharged into the soft-water basins. From the hard-water influent there is bypassed into the soft-water basins sufficient hard water to bring the water furnished to the consumers up to a hardness of 4 grains per gallon.

Some plants allow the hard water to continue through the mineral after the "exhaustion" point has been reached, until the softened water is brought back to the desired hardness for domestic use. It is debatable whether it is correct to so "starve" the material, or to regenerate as soon as the exhaustion point has been reached. These units are operated only until the mineral is exhausted. The point of exhaustion is determined by frequent soap tests applied near the end of each "run." It has been found that the amount of water that can be softened between regenerations varies with the hardness of the water.

The salt that is used for regenerating is stored in a reinforced-concrete pit outside the building proper. The top is at ground level so as to allow trucks to back over the openings and discharge the salt directly into the pit. From here the brine flows by gravity into a measuring tank located in the basement of the building. A gravel bed in the pit acts as a filter for removing the dirt and other foreign material in the salt. The salt is purchased in bulk in carload lots. A float valve on the water-supply line in the pit keeps the salt immersed at all times.

The brine in the measuring tank contains about 26 per cent by weight of salt. An ejector is used to force the brine through the softeners, which are located on the floor above. The amount of brine to be used is determined by a depth gage set in the measuring tank. The full strength of the brine is not used but is diluted to about 6 per cent by weight. An iron cock on the pressure line which feeds the ejector regulates its strength.

To regenerate a unit, which ordinarily is necessary two or three times per day, 32.5 cu.ft. of saturated brine is run through the zeolite for a period of ten minutes. Then hard water, at the rate of 4 g.p.m. per square foot, is run through for ten minutes. The rate is then increased to 6 g.p.m. for a period of about twenty minutes. Once a week this washing rate is increased to 8 g.p.m. per square foot. Near the end of the fast run, soap tests are made of the effluent. When a permanent lather is obtained the operator knows that all of the brine has been washed out of the units. The brine and wash water enter the tanks at the bottom, are drawn off at the top similar to the flow during softening, and are bypassed to the sewer.

The two softener units, which are 7 ft. in diameter and 12 ft. high, are placed in a vertical position upon the concrete floor. The floorslabs are directly over part of two rectangular basins of 100,000-gal. capacity each.

The basins are separated by a dividing wall running the entire length, pierced only at one end by a 10-in. pipe and valve at the floor level. The soft water, the hard water for adjusting the effluent, and the chlorine enter one of the basins at nearly the same point. The water and gas travel the entire length of the basin, pass through the 10-in. pipe embedded in the division wall, and back to the front of the other basin where they are picked up by the high-lift pumps. These pumps (810 g.p.m. and 420 g.p.m.) deliver the water into the distribution system and equalizing reservoir against a head of 425 ft. The entire plant is inclosed in a brick superstructure.

The rise of the mineral, at various rates of flow, was found to be as follows:

Rate, G.p.m.	Rise, In.	Per Cent
2	½	0.64
4	7	8.99
6	16	20.5
8	27	34.6
9	32	41.0

Table III shows a comparison of the well water before and after being softened in the municipal plant. The plant was built by day labor under the supervision of the writer.

Air Conditioning for Railroad Cars

To maintain comfortable temperature and cleanliness in railroad cars during the summer, when travel is often attended with discomfort due to heat, dust and smoke, both the Baltimore & Ohio R.R. and the Atchison, Topeka & Santa Fe Ry. are experimenting with an air-conditioning system which cools and cleans the air supply. Each road has a dining car thus equipped. Air drawn from the interior of the car and supplemented by outside air is passed through filters and cooling coils and then distributed through ducts to openings along the sides of the monitor roofs. The car windows are kept closed and the doors are opened only as persons pass in and out. The apparatus is under the control of the car conductor or steward and is able to deal promptly with special conditions such as the entrance of smoke when passing through tunnels. In a hot-weather test on the Baltimore & Ohio the interior temperature of 93 deg. was reduced to 70 deg. in twenty minutes after the apparatus had been put into service. On the Santa Fe, tests showed that with an atmospheric temperature of 104 deg. on the deserts, the interior of the car could be maintained at about 70 deg. In both cases the cooking stoves were in full operation.

Naval Ammunition Depot Near Hawthorne, Nev., Built to Serve the Pacific Coast

Magazine Spacing and Construction Conform to Recent Investigations and Follow New Formulas for Safe Storage of Explosives

By C. H. Cotter
Lieutenant Commander (C.E.C.), U.S.N.

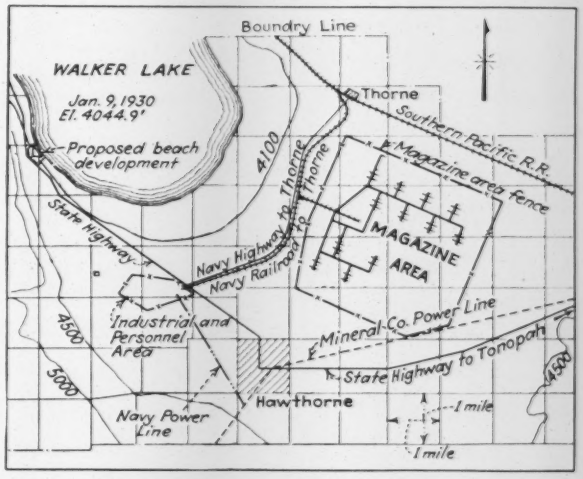
THE high-explosive depot to serve Pacific Coast naval activities, which has been under construction for the past two years near Walker Lake, Nev., is located about equidistant from the San Diego and Puget Sound areas and almost directly east of San Francisco Bay. The site was selected and construction of this depot was planned to relieve crowded conditions in existing eastern ammunition storage depots. The entire construction program is estimated to cost $3,500,000. It includes the many phases of engineering activity essential to building a permanent community in an arid region. Actual magazine spacing and construction conform to the results of the recent investigations in this field, which have produced some valuable new formulas relative to the safe storage of explosives.

Following the Lake Denmark explosion of 1926 the investigating board recommended that a new ammunition depot be established in the West to serve Pacific Coast activities. It was recommended that the location be less than 1,000 miles from the Coast on a tract of at least 100 square miles having convenient railroad facilities to Pacific harbors. Following an exhaustive investigation of about twenty possible sites, the location near Hawthorne, Nev., was selected and 180 square miles of public domain was set aside by order of the President, Oct. 27, 1926, for the exclusive use of the navy as an ammunition depot.

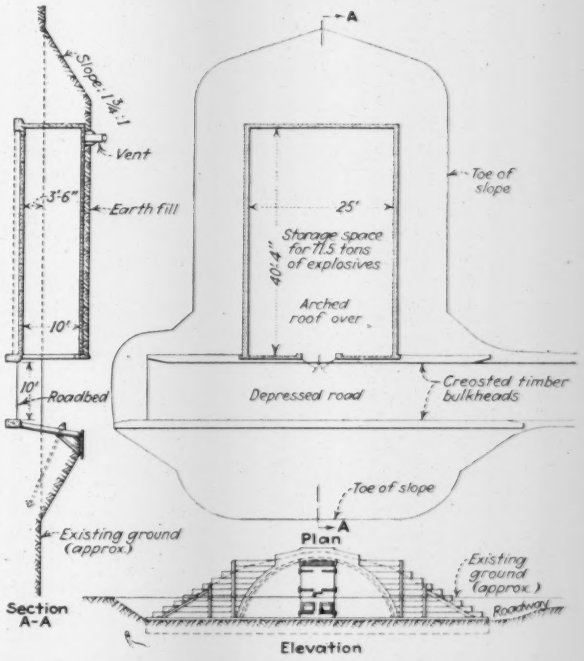
Local Conditions—In addition to being in a strategic location, the area selected possesses many natural advantages. The land belongs to the government and is not rated as capable of economic development; development of the station was not limited by restrictions common to depots situated in settled areas, and climatic conditions are particularly suitable. The elevation is about 4,000 ft., the average rainfall 3 in., and rarely is there a seriously heavy snowfall. The favorable topography of gentle slopes permitted economic layout of structures, and an abundant supply of concrete aggregate was available near the lake. Adequate railroad and highway facilities are close at hand and cheap power is available.

As a step preliminary to construction, a contract was awarded for building 7.7 miles of single-track railroad from Thorne, Nev., the nearest connection with the Southern Pacific Railroad. This branch extended to the industrial development with necessary sidings and a spur to the magazine area. Completion of this railroad to the site no doubt had a favorable influence on subsequent bids for major construction work.

Water-Supply Problems—The development of an adequate supply of potable water in an arid location was of extreme importance and presented serious problems. Chemical analyses of water from wells in the vicinity showed it to be unsuited for industrial purposes because of mineral content. This fact necessitated a study of the small creeks within the reservation along the slope of the mountains to the west as the only remaining fresh-water supply possibility. Of three creeks available, one is used for the town supply of Hawthorne, and because of its small runoff it was eliminated from further consideration. Of the other two, the one having a more sustained flow during the summer months and more satisfactory



GENERAL PLAN OF HAWTHORNE AMMUNITION DEPOT



PLAN AND SECTION OF ONE OF THE MAGAZINE UNITS

chemical analysis was selected as the initial water-supply development.

A 4-in. supply line about 5 miles long conveys water from the intake in the creek to a 600,000-gal. distribution reservoir near the industrial and personnel area. This reservoir is of reinforced-concrete with a flat slab roof covered with a 12-in. layer of earth. It is at sufficient elevation to provide fire protection to the entire area and is connected with an 8-in. cast-iron main 7,500 ft. long to the principal point of use. The water supply developed in this creek is not considered sufficient for the ultimate needs of the station, particularly during the low-flow summer months, and a large storage reservoir is contemplated.

Power and Roads

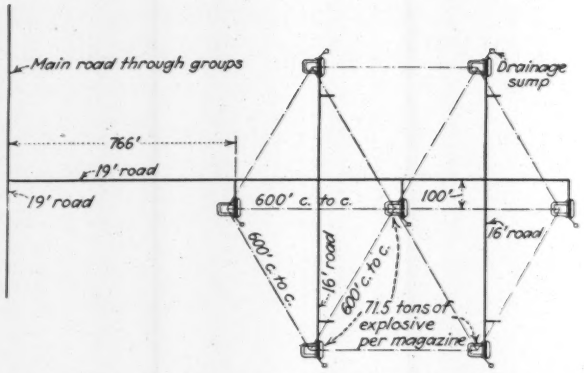
A 300-kva. electric substation and a few miles of transmission line were all the requirements needed to supply power to the depot from existing sources. A complete fire-alarm system with primary and standby power covers the entire area. A telephone system of the automatic type with underground ducts throughout the industrial and personnel area is provided.

An extensive system of roads to serve the area was required and was the next step in construction after the railroad. A study of the surfacing methods used by the Nevada highway department and of conditions encountered at the station led to the adoption of these methods as most applicable. The surfacing used consists of a 6-in. water-bound gravel and rock macadam. The maximum size of material used was 1 in. and 65 to 75 per cent was required to be coarser than an 8-mesh screen. Rolling of the subgrade or shoulders was not required, but the specifications provided that a 4-in. base course should be laid first, beginning nearest the crushing plant, while laying of the 2-in. top course should begin at the farthest point. This plan secured the maximum rolling effect of the trucks, which was found to be very effective.

The quantity of water used throughout the job was 46.3 gal. per cubic yard of surfacing material placed on the roads. Money expended for an adequate supply of water to be used in the construction of gravel roads in arid regions is considered by the writer a good investment because of the better compaction of the fills and the aid to the cementing action of the binder.

The main road was surfaced 18 ft. wide, secondary roads 14 and 12 ft.; the total length, 24 miles, cost $99,934, including all drainage structures. Based on the effect of traffic during the construction period, which will be more severe than that during future operations, the type of road construction selected is considered entirely satisfactory and is expected to be very durable.

An extensive system of underground conduits featured the minor construction projects in the industrial and personnel area. A steam-distribution system from a central boiler plant was laid to the various buildings. From an operating pressure of 100 lb., delivery is made to the buildings by pressure-reducing valves. Condensate return lines of cast-iron provide for gravity return flow to the plant. The sewage system consists of vitrified clay collecting lines discharging into a two-compartment, concrete septic tank. The effluent from this tank is distributed to a disposal field through 7,000 ft. of 3-in. farm tile. The electrical distribution system is entirely underground and includes concrete underground transformer vaults. Likewise, the fuel oil is distributed by underground pipe lines from the railroad to underground storage tanks and from these to points of use. All oil-storage tanks are provided with steam-smothering lines for fire protection.



LAYOUT SHOWING A SEVEN-UNIT MAGAZINE GROUP

Recreation Facilities—Situated in a desert region surrounded by practically barren mountains, the provision of suitable facilities for recreation and exercise of the personnel stationed at this depot was recognized as important. Walker Lake, a body of salt water about 25 miles long and 2 to 5 miles wide, adjoins the station and provides the logical point of development. A contract was let for bathhouses, a breakwater and diving floats, in addition to a small pier and boat anchorages. Fed only by the insufficient flow of the small creeks, the water surface in recent years has been lowering at the rate of approximately 3½ ft. per year. The resulting recession of the shoreline made necessary the provision that structures could be moved by the depot personnel at a minimum expense. The breakwater, therefore, is of sectional floating type, held in position by chains attached to concrete anchors. Bathhouses also were designed with substantial framing to permit moving. Pier construction consisted of an earthfill from the road to a point where the water was 8 ft. deep. At the end two floating sections, 14 ft. wide and 30 ft. long, supported on cylindrical steel floats, are provided, held in position by concrete anchors. As required, the fill may be extended and the floating sections moved out.

Landscaping of the industrial and personnel areas was given particular study with a view to establishing windbreaks to lessen the movement of sand and also to counteract the depressing effect of the vast areas practically devoid of vegetation. Careful selection was made of shrubs, evergreens and plants which might be expected to thrive under the prevailing conditions and it is hoped that this part of the project will not only be a source of interest to the personnel of the station but also will be of considerable value to the state of Nevada as indicating the varieties of trees and plants which can be grown in this region.

Design and Spacing of Magazines—A factor of major technical importance was the design of the magazine layout as to proper spacing and the construction of the magazines. The most stringent state regulations for the storage of high explosives in this country are the laws of New Jersey. These laws, together with the American Table of Distances, are the result of studying every major explosion since 1863 on which reliable data could be obtained. Following the Lake Denmark explosion four years ago, a naval board of which Captain E. R. Gayler (C.E.C.), U.S.N., was senior member, made a thorough study of the damage and recommended the following formulas for high-explosive magazine spacing,

in which d equals distance in feet and Q the quantity of explosives in pounds, stored in one building.

(1) Where conditions permit complete protection to inhabited buildings, to the extent that breaking of windows will be practically eliminated, $d = 34\sqrt{Q}$.
(2) Where a small measure of damage is unavoidable, $d = 15\sqrt{Q}$.
(3) For the protection of plant buildings not containing explosives, $d = 7.5\sqrt{Q}$.
(4) For distance between well-constructed magazines containing similar kinds of explosives, to prevent structural damage, $d = 2\sqrt{Q}$.
(5) For the prevention of induced, sympathetic or near sympathetic explosions between magazines with barricades, $d = 0.2\sqrt{Q}$.

Formulas 1, 2, 3 and 4 indicate distances permissible without barricades. With suitable barricades these distances may be reduced by one-half. The board considered that formulas 1, 2 and 3, inclusive, were based on well-established principles but believed that formulas 4 and 5 should be verified by large-scale tests.

In designing the magazine layout for the Hawthorne storage, the recommendations of the Gayler board were followed closely. Each group of seven magazines forms an approximate hexagon with one building at each angle of the perimeter and one in the center. A distance of 600 ft. c. to c. separates these seven magazines in the group. This spacing is considered more than ample to prevent induced or sympathetic explosions within the several units of the group. The maximum probable loss would be explosive stored in one magazine building, amounting to 143,000 lb., which is 1.19 per cent of the total storage.

As a further precaution, each group is spaced 3,000 ft. c. to c. from the adjacent groups. This is a sufficient distance to prevent damage extending into adjoining groups in the remote event of simultaneous destruction of all seven magazines in any one group. Thus, the maximum loss possible is believed to be the amount of explosive stored in one group, namely, 1,000,000 lb. or 8.33 per cent of the entire storage.

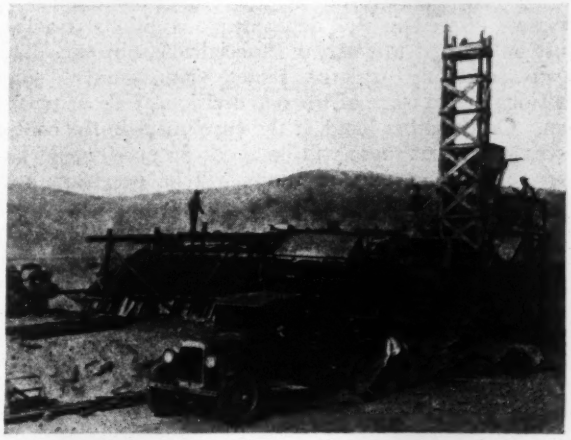
Because of the area available at the Hawthorne depot it was entirely feasible to secure greater distances from inhabited and developed sections than is possible in congested districts. The industrial and personnel section of the depot is situated 14,500 ft. from the nearest magazine. The nearest inhabited building is 8,000 ft. distant, and the public highway and commercial railroad are 4,000 and 6,000 ft., respectively, from the nearest magazine. With these distances and barricades there is a large factor of safety, and danger to property outside the depot is believed to be entirely eliminated.

The design of the individual magazines is similar to that of the units constructed at the navy mine depot at Yorktown, Va., in 1928. Because of the arid condition at the Hawthorne site and the sandy soil, it was possible to place the floor level of each magazine 4 ft. below ground level and provide access by means of a depressed roadway. This lowering of the floor level practically equalized cut and fill, thus reducing construction costs. The following general safety requirements governed magazine design and construction: (1) Structure must be fireproof; (2) construction materials must not be capable of forming dangerous missiles; (3) strength must be sufficient to resist external blast pressures and to stop missiles, including rifle bullets; (4) spacing distances must be safe; (5) structure must be protected from lightning, and must have all reinforcing and metal parts grounded; (6) protection from fire must be assured by cleared ground and distance from fire hazard; (7) no electrical connections are permissible; and (8) floor surfaces must be non-sparking.

The general dimensions and layout of each magazine are shown in the accompanying drawing. All reinforcing steel and other metal parts are electrically connected to a copper girdle circling the entire structure and embedded in the footing. The typical magazine of 143,000-lb. capacity is 40 ft. 4 in. long, 25 ft. wide, with a maximum height of 10 ft. at the center of the arch roof. A complete covering of earth is provided on top and sides except in front where the depressed roadway gives access to the door. An earth barricade is provided on the opposite side of this depressed entrance.

Concreting of the magazines was done with a portable mixing plant and a hoisting tower mounted on skids. Batches of aggregate were brought in three-compartment trucks from the screening and weighing plant. Concrete strength for the magazines was specified as 2,500 lb., and 6¼ gal. of water per sack of cement was used. A crawler tractor operated the hoist and was used to move it between units. Vibrating hammers were used on the concrete forms, driven by air from a portable compressor.

Organization—The project has been constructed under the direction of the bureau of yards and docks, Navy Department, Washington, D. C. The writer is officer in charge of construction with Lieut. W. O. Hiltabidle (C.E.C.), U. S. N., as principal assistant. Field surveys were made under the direction of Wade C. West, associate engineer.



CONCRETING SET-UP FOR POURING MAGAZINE UNIT
Skid-mounted tower is operated and moved by tractor. Compressor at left used for pneumatic vibrating hammers.

Railway Electrification in England

Electric traction on railways in England aggregated 570 route-miles at the end of 1929, with 1,350 miles of track or 1,514 miles, including sidings. All of these lines are for suburban or London underground traffic, with multiple-unit equipment, except for an 18½-mile coal branch of the London & Northeastern Ry. Extensions of suburban electrification are being carried out at two or three cities. Main-line electrification is unlikely, according to a recent paper, owing to the abundant supply of good coal and to the fact that a large part of the freight traffic consists of coal for export or local distribution, so that saving in fuel cost is only one of many factors in relation to electrification.

Present Trends in Engineering Education

Colleges and Universities Foster the Multiplication of Types of Engineers by Providing Many Special Vocational Courses—Broader Fundamental Training Needed

By Harry Tucker

Professor of Highway Engineering, State College of Agriculture and Engineering, Raleigh, N. C.

ENGINEERING EDUCATION has changed in some respects during the last twenty years. The World War, being a war of materials and processes as well as of men, popularized engineering. As with the popular term "business," engineering is now being used as an adjective to describe many occupations that are only remotely related to the fundamental principles technically embraced in engineering. *Engineering News-Record* for some years listed, from time to time under "Random Lines," many varieties of engineers and engineering. Certainly the name has been grossly abused; the evil is that the misuse of the term, if unrestrained, may become so fixed that the original distinctions of this honorable profession may be entirely forgotten.

The five fundamental branches of engineering are generally considered as chemical, civil, electrical, mechanical and mining engineering. Being interested in what variations of these divisions of engineering were being taught in the technical colleges, recent catalogs of 71 colleges and universities were examined by the author, and from them a tabulation was prepared of all the different kinds of engineering listed in the curricula of these schools. Only those branches of engineering were included in which degrees were offered, or in which options were permitted in the junior or senior year or both. The accompanying table gives the number of schools (on the basis of 71 examined) offering curricula in each branch of engineering.

These 71 colleges and universities are thus together offering curricula in 73 different branches of engineering. It is possible that a few of the divisions should not be included in a list of branches of engineering, for example, economic geology, but all divisions given in the above list have definite curricula in the engineering school of the college or university.

BRANCHES OF ENGINEERING INCLUDED IN CURRICULA OF 71 SCHOOLS

	No. of Schools		No. of Schools
Administration	1	Industrial arts	1
Agricultural	12	Industrial arts education	1
Architecture	14	Industrial chemistry	1
Architectural	11	Industrial	15
Areonautical	7	Industrial management	1
Automobile	1	Industrial shop administration	1
Building construction	1	Irrigation	3
Ceramic	6	Irrigation and drainage	1
Ceramics	1	Landscape architecture	1
Chemical	44	Marine	2
Civil	64	Mechanical	64
Civil and irrigation	1	Metallurgical	11
Commercial	2	Metallurgical chemistry	1
Construction	2	Metallurgy	5
Economic geology	2	Milling	1
Electrical	63	Mine	1
Electro-chemical	2	Mining	22
Engineer of mines	1	Mining geology	1
Engineering	1	Municipal	1
Engineering administration	1	Municipal and sanitary	3
Engineering physics	2	Naval architecture	3
Experimental	2	Petroleum	4
Fire-protection	1	Power	1
Flour mill	1	Power-plant	1
Fuel	1	Radio	2
Gas	2	Railroad	5
General	4	Railway civil	1
Geodetic	1	Railway electrical	1
Geological	2	Railway mechanical	1
Heat	1	Sanitary	8
Heating, ventilating and refrigeration	1	Sanitary and municipal	1
Highway	10	Steam	2
Hydraulic	7	Steam-power	1
Hydro-mechanical	1	Structural	6
Illuminating	1	Telephone and telegraph	1
Internal combustion	1	Transportation	1
		Textile	3

Vocational Aim in Engineering Education

A number of conclusions can be drawn from the data submitted above: first, the increasing tendency to separate engineering into many vocational divisions; second, the use of several names to describe the same vocation, and, therefore, the lack of uniformity among the technical schools in this respect; third, the prominent places still given in most of the schools to the five fundamental branches of engineering—chemical, civil, electrical, mechanical and mining.

The vocational aim of the students in technical colleges has become an obsession with many educators. This influence has undoubtedly been responsible for the many different kinds of engineering curricula which are being offered. Under some conditions the wise selection of engineering curricula, in keeping with the needs of industry for specialists, may be feasible; under other conditions the system tends to duplication of instruction in the smaller colleges and is therefore wasteful of funds available for education.

Practically, a curriculum in a special branch of engineering is indicated when there has developed a fairly well-defined and continuous demand for engineers with a special knowledge of that particular field of engineering. In the larger technical colleges such new specialized courses can be given without much additional cost; in the smaller colleges, however, each new curriculum calls for a relatively heavy increase in the yearly budget of the institution. The reason is clear. A department of say civil engineering, may be organized so that classes from which an average of twenty men will graduate can be taught comfortably. If several optional curricula are now offered in this department, additional teachers must be secured to teach the specialized subjects. This means, certainly for the senior class, several small divisions in the place of the one division of about twenty men. On the other hand, if the enrollment in the college increases so that there will be about 35 or 40 seniors in civil engineering, new divisions will be necessary anyway and new teachers. A new curriculum then can be offered without increasing the number of teachers that would normally be required, as the new teachers can be selected to teach the courses offered in the new divisions.

It is doubtful whether there is much advantage in an engineering student taking a highly specialized curriculum. For one thing, he might not be able to secure a position in his particular vocation upon graduation, and, in consequence, he would be compelled to enter some line of industry where his special training would be of little value. Then, too, companies employing young graduate engineers, as a rule, are not so much interested

in their vocational aims, provided they have been thoroughly trained in the fundamentals of engineering.

Lack of Uniformity

It may be granted that too much standardization among technical schools is not desirable; that the location of a school and its general purpose may necessitate its offering many curricula in engineering. Thus, a college sponsored by a state, primarily interested in the development of the natural resources and industries of that state, may properly offer specialized curricula in engineering. This condition is no doubt responsible for courses offered in certain schools in textile, petroleum, irrigation and marine engineering. But the number of divisions of engineering to be made ought to be limited, if for no other reason than the avoidance of confusion in the minds of those employing engineers.

The tendency of technical schools to use different terms to describe the same subdivision of engineering is apparent from an examination of the above table. This is well illustrated by the promiscuous use of the terms engineering, commercial engineering, general engineering and industrial engineering. It is quite likely that each of these names is used separately to describe a curriculum covering the fundamentals of engineering and economics and business methods. The proper name might be selected and used by all colleges giving such courses, thus gaining uniformity in the designation of engineering curricula.

The Five Main Divisions of Engineering

Of the 71 schools whose curricula were examined the number giving courses in the five fundamental divisions of engineering are as follows: chemical engineering, 44; civil engineering, 64; electrical engineering, 63; mechanical engineering, 64; mining engineering, 22. This certainly indicates the fact that these divisions are the fundamental divisions. Whether they should be the only divisions is quite another thing. Clearly, however, there are many kinds of engineering which might properly be classed under one of these five main heads. For example, engineer of mines and mine engineering under mining engineering; steam engineering and internal combustion engineering under mechanical engineering. Only two schools among those examined—Princeton University and the University of Virginia—seem to have curricula in all five of the main divisions of engineering with no additional subdivisions. However, there are quite a few courses in experimental engineering offered at the University of Virginia, but they seem to be designed primarily for inclusion in the several regular engineering curricula.

It is possible that some new division of engineering will have to be added to the five major divisions to cover the many general engineering courses which are now being given. Industrial engineering seems to be the most general term now used to cover these courses.

The breaking up of engineering into many specialized divisions complicates the work of examining boards in those states which have laws requiring the licensing of engineers. Some of the states attempt to register an applicant in the particular branch of engineering he is attempting to practice. Others examine him in his particular branch, but register him merely as "engineer." By limiting the examination of applicants to the five main divisions of engineering the boards could assist in clarifying the confusion which has resulted from the great number of different kinds of engineers now practicing the profession.

The technical schools differ in many other points in addition to offering a wide variety of engineering curricula. The majority of the schools give a "B.S. in Engineering" for the undergraduate degree. But several colleges turn this around and give an "S.B." In a few others the degree of "Bachelor of Engineering" is given. Still others give the professional degree—for example, "C.E." for undergraduate work. Stanford University gives the degree of "B.A. in Engineering;" Ohio State University gives the bachelor's degree in the particular branch of engineering—for example, "Bachelor of Civil Engineering." In this matter there could certainly be standardization, without any school losing its individuality.

Whether agricultural engineering should be in the school of engineering or the school of agriculture seems to have been a problem in some of the technical schools. The same thing applies to architecture and architectural engineering. In some colleges these two curricula are in the engineering school; in others they are in the school of architecture or the school of fine arts.

Modern Languages in Curricula

It is interesting and surprising to note that only a few of the technical schools are requiring any modern language in their engineering curricula. Generally, a modern language may be selected as an elective. With the engineer's work constantly broadening and his activities often taking him into foreign fields it would seem essential that he should have some knowledge of a modern language. Its value, however, must not be very real, otherwise more schools would be requiring it in their engineering curricula.

The co-operative system of technical education is used in several of the schools, of which the University of Cincinnati is an example. This method seems to be successful in those schools which are located in large cities or industrial centers, where it is fairly easy to place students in positions in which they can not only gain experience but also earn a livelihood.

It is refreshing to note that most of the technical schools have identical courses for the first year in all engineering curricula. There is likewise considerable similarity in the second year. It is becoming quite a common practice to offer optional courses in the fundamental branches of engineering only in the third and fourth years.

Broader Engineering Classifications Needed

It should be remembered that the data presented here have been collected from the catalogs of only 71 technical schools. No examination has been made of the engineering curriculum offered by many other equally prominent colleges and universities. A more detailed and careful study of the engineering courses offered by all technical schools in the country may lengthen the list of subdivisions of engineering. But this information, incomplete as it may be, shows that the wide use of the word engineering has not been confined to the unenlightened; but that some of our colleges and universities are giving standing to many varieties of engineering by offering curricula in specialized branches of engineering. It is believed that there are many reasons why the divisions of engineering should be limited, certainly by those institutions which have influence in fixing the use of terms for designating engineering curricula. Some thought and study of this matter by interested engineers and educators may bring about more orderly use of terms in this honorable profession of engineering.

Sanitary Engineering and Public Health in Manila

Achievements in Water Supply, Sewerage, Night Soil and Other Wastes Disposal, Plumbing Inspection, Mosquito Control and Vital Statistics of Chief City of the Philippine Islands

By Harold E. Babbitt
Professor of Sanitary Engineering, University of Illinois, Urbana

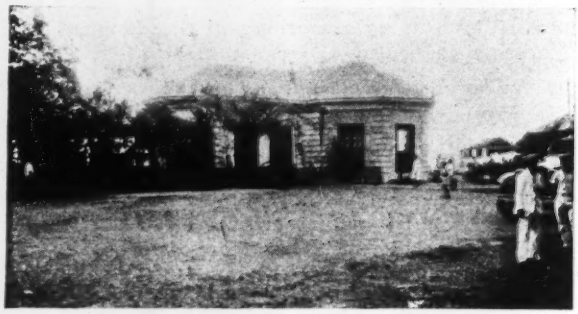
THE signal success of American sanitarians in Cuba, Panama, Porto Rico, the Philippines and other tropical localities has attracted the attention of the world to their work. It is probable that the completion of the Panama Canal might not have been possible without the work of the Reed board in Havana, which resulted in the victory over yellow fever. The successful solution of the problems of sanitation in the tropics when first encountered is not a measure of the results which are to be attained during later years of control either by American authorities or by the governments to which America has relinquished control. The results can be measured best by a study of existing conditions and the relative success of the local inhabitants in applying the principles taught.

Conditions in Manila offer an excellent opportunity for study. It is interesting to observe that the offices of the public health service in the city are entirely in the hands of Filipinos and that the controlling officials are earnestly striving to place Manila among the cleanest and healthiest capitals of the world. This goal is still far from attainment, however, and the health authorities are handicapped by local indifference and a lack of funds.

Organization of Sanitary Work

The division of sanitary engineering of the Philippine Health Service is divided into two sections, the provincial and the city of Manila. The section of malaria control has recently been separated from the division of sanitary engineering and raised to the grade of a division of the Philippine Health Service. The activities of the division of sanitary engineering, with special reference to Manila, include: the solution of problems of municipal engineering arising in sewage disposal, garbage disposal, town planning, housing conditions and other sanitary problems; the inspection and approval of building plans and the issuance of building certificates; structural sanitary inspections and the issuance of sanitary orders due to structural defects of private premises; the enforcement of water-supply, sewerage and waste-disposal regulations; the study of private wells and soil-pollution problems; the organization and supervision of rat-, fly-, and mosquito-control forces; the examination of master plumbers; public education in matters of sanitary engineering; co-operation with the office of industrial hygiene in the study of industrial problems; and the supervision of such other matters of sanitation as may be ordered by the director of the Philippine Health Service.

A summary of some of the work done by the division of sanitary engineering during the past ten years is given in Table I. It is to be noted that the sanitary engineer is not responsible for procuring, purifying or distributing the public water supply, although he is required to enforce regulations made with regard to the quality of the water. There is close co-operation between the division of sanitary engineering and the Metropolitan Water District.



MAIN SEWAGE-PUMPING STATION AT MANILA

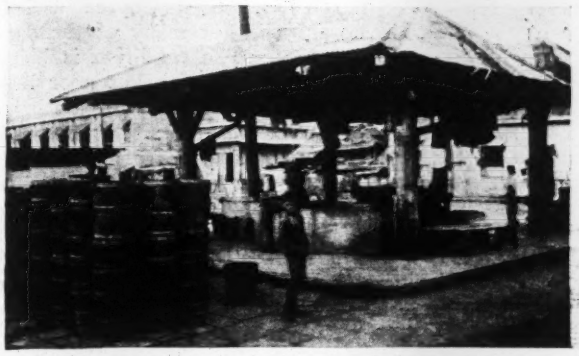
Nature and Extent of Water Supply

The water-works of Manila were described by Paul W. Mack in *Engineering News-Record*, May 31, 1928, p. 841. The water supply is secured at present from the impounding reservoirs formed by the Montalban Dam, completed in 1910, and by the Novaliches Dam, completed in 1929. An emergency supply is available from the old Spanish water-works at Santolan. The three sources of supply are potable and are treated only by the application of a small amount of chlorine, but the

TABLE I—SANITARY ENGINEERING WORK IN MANILA FOR TEN YEARS

Specifications	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929*
Building plans approved	1,111	1,040	1,952	1,195	1,163	1,194	1,299	1,335	1,527	1,428
Buildings completed	332	365	744	614	625	802	993	782	749	696
Permits for minor buildings approved	481	1,007	1,054	1,132	1,053	1,429	1,194	1,415	1,543	1,529
Permits for minor buildings disapproved	46	77	183	218	277	363	166	203	316	338
Permits for light and mixed building construction approved	926	1,004	353	653	949	1,318	953	614	1,064	1,100
Permits for light and mixed building construction disapproved	447	398	105	182	335	327	229	127	325	545
Plumbing permits issued	1,226	1,420	1,506	1,537	1,757	2,370	1,877	1,820	1,925	1,811
Plumbing projects completed	1,053	1,288	1,486	1,296	1,397	2,112	1,709	1,748	1,695	1,493
Premises connected to sanitary sewers†	225	279	287	250	289	252*	233	226	194	186
Prosecutions, convictions	10	13	30	7	10	9	9	9	3	7‡
Prosecutions, dismissals	1	11	16	6	8	44	76	79	49	12‡

*To Dec. 27, 1929, except as noted. †Premises connected to the sanitary sewer up to Dec. 31, 1925, were 7,174. ‡To Dec. 1, 1929.



MANILA NIGHT-SOIL DUMPING STATION
Buckets in which night soil of unsewered parts of Manila is collected and dumped into the sewer, after which the buckets are washed and returned for use.

high typhoid death rate in Manila and the occasional high bacteria counts in the public water supply have led the authorities to include a rapid sand-filter plant in the improvements now under way. These improvements include also the construction of a diversion dam across the Angat River, the minimum flow of which is about 80,000,000 gal. per day (80 m.g.d.). The water will be conveyed through the Angat aqueduct, which is 19.3 miles long, including 10 miles of concrete pipe and 9.3 miles of rock tunnel now under construction. The construction of the Angat Dam was to be started early in 1930. When this project is completed the supply of filtered water to Manila will be 40 m.g.d., with the possibility of extension to 80 m.g.d. through additions to the filter plant.

The water supply delivered to Manila by the Metropolitan Water District is supplemented by public and private wells, mostly artesian. The sanitary quality of the water from these wells is generally as satisfactory as that of the public water supply. In those relatively small areas of the city where water is distributed by carts (*aguadores*) a strict supervision is maintained by the division of sanitary engineering over the cleanliness of the carts and the physical condition of the individuals handling the water. Control is maintained by the issue of licenses which may be revoked if unsatisfactory conditions are found.

Only a Third of City Has Sewers

The sewer system of Manila serves only about one-third of the city (present population assumed to be nearly 330,000). The remaining two-thirds of the city is served by septic tanks, which discharge into surface drains, or by the pail or dry system. The effluents from the septic tanks, in some districts, are discharged into gutters or into near-by open ditches. The ground slope

TABLE II—CASES AND DEATHS FROM IMPORTANT COMMUNICABLE DISEASES IN THE PHILIPPINES
(Compiled From the Report of the Philippine Health Service for 1926)

	Manila			Provinces		
		Deaths			Deaths	
Disease	No. of Cases	No.	Rate per 100,000	No. of Cases	No.	Rate per 100,000
Tuberculosis	3,762	1,950	617.1	.....	28,636	261.7
Beriberi	.....	526	166.5	.....	18,678	170.7
Malaria	.....	51	16.1	.....	24,317	222
Dysentery	494	266	84.1	16,554	9,073	82.7
Influenza	265	74	23.4	13,040	6,209	56.6
Measles	239	15	4.7	7,794	2,892	26.4
Typhoid	350	92	29.1	1,915	1,411	12.8
Cholera	33	8	2.5	301	205	1.8
Diphtheria	124	25	7.9	150	95	0.8
Smallpox	0	0	0	0	0	0
Plague	0	0	0	0	0	0

TABLE III—WATER AND SEWER CONNECTIONS, SEPTIC TANK INSTALLATIONS AND PLUMBING WORK IN MANILA

	1926	1927	1928	1929*
Water connections	1,303	1,547	1,577	1,172
Sewer connections	233	228	194	168
Septic tank installations	148	174	213	218
Plumbing fixtures installed	10,836	11,904	12,010	11,209
Plumbing projects completed	1,709	1,748	1,695	1,393
Estimated value of plumbing projects completed, dollars	208,492	203,831	197,476	177,963

*To Nov. 30, 1929. There are about 24,150 water services, 8,000 sewer connections and 3,000 premises dependent on the pail system.

is frequently so flat that the gutters and ditches stand full of septic effluent, presenting a condition which may contribute to the higher morbidity and mortality rates for some communicable diseases in Manila than in the provinces (Table II). The number of water and sewer connections and of septic tank installations and the amount of plumbing performed in Manila since 1925 are shown in Table III, indicating recent progress in sanitation.

Night-soil pails are collected, emptied, cleaned and returned by the city. The contents are dumped into the sewers. The disposal of the sewage presents no serious problem. It is pumped through the submerged outfall

WATER-SETTLING BASIN UNDER CONSTRUCTION

sewer which terminates about half a mile offshore. The end of the outfall sewer is so located that the prevailing wind and ocean currents carry the sewage away from the shore. The topography of the city is flat, and portions are so low as to require sewage-pumping stations.

Surface drainage is inadequate in portions of the city, with the result that swampy areas and stagnant pools are widespread. In some districts the houses are built on stilts over the standing water. The abolition of this condition is now being undertaken by the city by filling in under the houses. Progress is slow and there is a lack of interest on the part of the residents in the districts to be improved. The widespread presence of standing water makes the mosquito a common pest. The relatively low malaria rate would indicate the absence of the anopheles mosquito, however.

Residence Districts

The best residences and public buildings of Manila are grouped in a district to the southeast of the business center. The district is well kept and beautiful and can be compared favorably with other fine cities of the world. The district is served by the public water supply, is completely sewered, and has wide, paved, shady streets which are well lighted at night. Less pretentious residences and apartment houses are to be found in the same district and in more closely built-up districts. Within the oldest district, known as Intramuros, the

NIPA HUTS IN UNDRAINED DISTRICT OF MANILA

houses are built of stone in the old Spanish style, with common walls and no space between the front wall and the narrow street. Only small courtyards and areaways remain for light and for breathing space. Conditions in some of these courtyards are extremely crowded. Fifty families may be found living in a courtyard less than 30 meters square. Each family lives in a room or rooms, constructed of bamboo, in tiers of two or three stories leaning against the walls of the courtyard like birdcages. The overhanging eaves of the building and the corrugated metal or thatched tops of the rooms lend a dim light to the unattractive scene. A place in which three

TABLE IV—BREEDING PLACES OF MOSQUITOES IN MANILA

Genera of Mosquito	Pools	Wells	Catch-basins	Street Drains	Marsh	Ditch Grass Field	Other Breeding Places
Anopheles	9,531	5	0	43	86	151	33
Aedes	3,306	24	15	733	165	63	260
Culex	36,808	1,866	1,273	9,481	1,798	6,096	3,394
Megarhinus	269	13	4	116	103	136	180

TABLE V—MORTALITY RATES FOR SOME DISEASES IN MANILA
(Rates Per 100,000)

	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928
Typhoid	62.98	80.61	74.08	109.09	88.85	69.80	54.78	29.19	32.15	57.31
Cholera	117.27	0.67	7.10	7.34	0	0.32	22.03	2.53	.....	.....
Dysentery	139.19	90.91	50.40	41.37	37.84	47.73	39.73	84.11	75.53	40.7
Malaria	.....	.....	20.63	12.01	9.21	16.23	18.91	16.1	.....	.....

or four families resided was particularly striking. It was constructed in the archway of a building leading to a crowded courtyard. The archway was about 40 ft. long, 15 ft. wide, and 20 ft. high. Boards, to form the floor of the rooms, had been thrown across at the haunch of the arch about 10 ft. above the ground. The rooms were separated by bamboo and matting partitions. Light came in through the large cracks in the floorboards and through openings in the partitions. It is not unusual to see rooms supported high above the ground on bamboo poles and tucked into niches between buildings. In these crowded areaways there is usually a public hydrant and a latrine which serve the near-by dwellers. In spite of the crowded conditions in these districts the rooms and alleyways were remarkably clean.

The poorest dwellings in Manila are the nipa huts. These are built of the dried leaves of the nipa palm, with split bamboo floors, the structure being supported about 8 ft. above the ground on bamboo poles. In some districts the huts are so close together that they make one large building with covered interior passageways and inside rooms. The may be built over undrained, swampy land. The moist, dimly lighted space beneath the hut is used for storage and for many of the daylight activities of the family. The condition is being battled valiantly by the authorities with but poor help from those dwelling in the district. Fire has been a helpful factor in doing away with these huts. Once started, the fire spreads rapidly, destroying many of them. The city prohibits their reconstruction within limited fire districts, so that the ultimate disappearance of the huts is assured.

Garbage and wastes are collected and disposed of by the city. An incinerator, which has reached its capacity, and a dump are maintained for the purpose. Both are in sanitary condition and are performing their functions satisfactorily without danger to the public health or comfort. There are some occupied nipa huts too close to the edge of the dump, however.

Malaria and Mosquito Control

The control of malaria and the extermination of mosquitoes are important activities of the health authorities. The methods pursued by them in the extermination of mosquitoes include: draining, filling of wet places, oiling of pools and other places where water may collect, and the detection and destruction or control of such water containers as broken bottles, bamboo stumps, icebox drains, flower pots, etc. The activities of the health authorities in this connection are shown by the number and class of breeding places where various genera of mosquitoes have been found (Table IV).

The battle against communicable diseases is not entirely a matter of sanitary engineering, but the success and value of sanitary engineering works are indicated by the death rates for certain diseases, particularly typhoid, cholera, dysentery and malaria. Statistics of these diseases are shown in Table V.

The salaries paid for the various grades in the division of sanitary engineering are low. The annual salary of the chief engineer is equivalent to $3,000. His two principal assistants receive $2,000 and $1,500 respectively, and the most poorly paid draftsman receives $240 annually.

Jacobo Fajarado, M. D., is director of the Bureau of Public Health and M. Manosa is chief engineer of the division of sanitary engineering.

Traffic Circle Troubles in London

Full use of a traffic circle in London has run against a snag in the way of opposition by the Pedestrians Association. The London and Home Counties' Traffic Advisory Committee, according to the *Surveyor* of Sept. 26, p. 308, recommended that pedestrians be prohibited from crossing Parliament Square, which is used as a traffic "roundabout." The pedestrians object on the ground that it would set a precedent in "taking away the right of pedestrians to cross highways that have been used by the walking public from time immemorial." Other objections noted are lost time for the walking public and the tendency to divert pedestrians, with consequent loss of business to abutting owners. Moderation in speed and insertion of street refuges to permit pedestrians to pass are recommended rather than prohibition altogether. In editorial comment the *Surveyor* feels that the "abrogation of public rights" is a dangerous precedent becoming increasingly frequent "in the sacred name of motoring."

Wood, Iron and Combination Trusses in Old Vincennes Bridge

Wabash River Bridge of 1868, Partly Rebuilt Later, to Be Replaced With Concrete Arches—Curious Truss Details

A CURIOUS old highway bridge still in service over the Wabash River at Vincennes, Ind., built originally in 1867 and partly rebuilt and strengthened at different times, is to be replaced soon with a concrete arch bridge which will be a memorial to George Rogers Clark, the explorer. The bridge connects the highway systems of Indiana and Illinois and is on federal route No. 50. Its present condition is shown in Fig. 1, while the original and reconstructed designs are shown in Fig. 2.

Early History of Bridge—From an investigation of the city records, made recently for the purpose of this article by W. C. Mason, president of the Vincennes Historical Society, it appears that on Dec. 18, 1865, an ordinance was passed authorizing the city officials to subscribe for $20,000 of the stock of the Vincennes Drawbridge Co. The population then was about 5,000 and ferry service had become inadequate. On Nov. 19, 1866, the city was petitioned to take additional stock to the amount of $25,000 and on Feb. 4, 1867, an ordinance was passed providing for this purchase, making the city's interest $45,000. The date of letting the contract for construction is uncertain, but the records show that the bridge was completed in 1868. As then built it consisted of four covered timber-truss spans of 148 ft. 7 in. to 156 ft. 8½ in. clear span, on abutments and narrow piers of stone masonry. For navigation, there was a hand-operated combination iron and timber-truss swing span about 145 ft. long, mounted on a masonry pivot pier 20 ft. 6 in. wide.

In April, 1869, the two fixed spans on the Indiana side were partly destroyed by a cyclone. On May 17 the city appropriated $15,000 for repairs, which work was ordered on June 12. In 1874, with the city owning 60 per cent of the company's stock, it was found necessary to replace these two repaired spans, and it was recommended that iron spans should be built. A contract for this work, at $10,000, was let to the Massillon Iron Bridge Co. on June 28, 1875, and the new spans were completed the same year. The structure was operated as a toll bridge until 1889, when the city bought all the outstanding stock of the company and made the bridge free to traffic.

Recent Developments—For the past ten years the bridge has been a link in the state highway systems of Indiana and Illinois. A new timber floor was placed in 1921 at the joint expense of the two states. Negotiations were started about that time looking to the construction of a new bridge. About 1923 the Illinois division of highways in collaboration with the Indiana state highway commission proceeded with the preparation of plans for a high-level steel-truss bridge one city block downstream from the old bridge and approximately parallel to it.

In 1925 the old timber trusses on the Illinois side of the river, from which the protecting roof and siding had been missing for some time, had rotted badly at the bearings, and since financial arrangements for the new bridge were not completed, trestle bents were placed under the first panel point from each end of one span and at one end of the other span, as shown in Fig. 2. Later, bents were placed under the middle of each span, protecting timber cutwaters were placed and the trusses were reinforced. Late in 1926, since arrangements for financing the new bridge were still incomplete and the old timber spans were beyond repair, a contract was let for their replacement with steel-truss spans. This work was finished early in 1927.

The Indiana legislature in 1927 enacted legislation and appropriated funds looking toward the erection of a memorial to George Rogers Clark on the old site of Fort Sackville. Later, the federal Congress appropriated funds for its share of this project. As the site includes the Indiana end of the proposed new bridge and approach, the sponsors of the memorial urged that the bridge should harmonize with the character of the memorial. Consequently, the Indiana state highway commission has completed plans for a high-level seven-span reinforced-concrete arch bridge of the open spandrel type, having a central span of 180 ft. flanked on each side by arches of 170 ft., 145 ft. and 80 ft. span, consecutively, as shown in Fig. 3. In the center span the roadway will be 36 ft. above flood level, or about 32 ft. higher than the deck of the present structure. There will be a 20-ft. roadway and two 5-ft. sidewalks.

In August, 1929, the old swing span was declared unsafe. In order to provide for traffic until the new bridge

FIG. 1—OLD BRIDGE AT VINCENNES, IND. VIEW TAKEN IN FEBRUARY, 1930

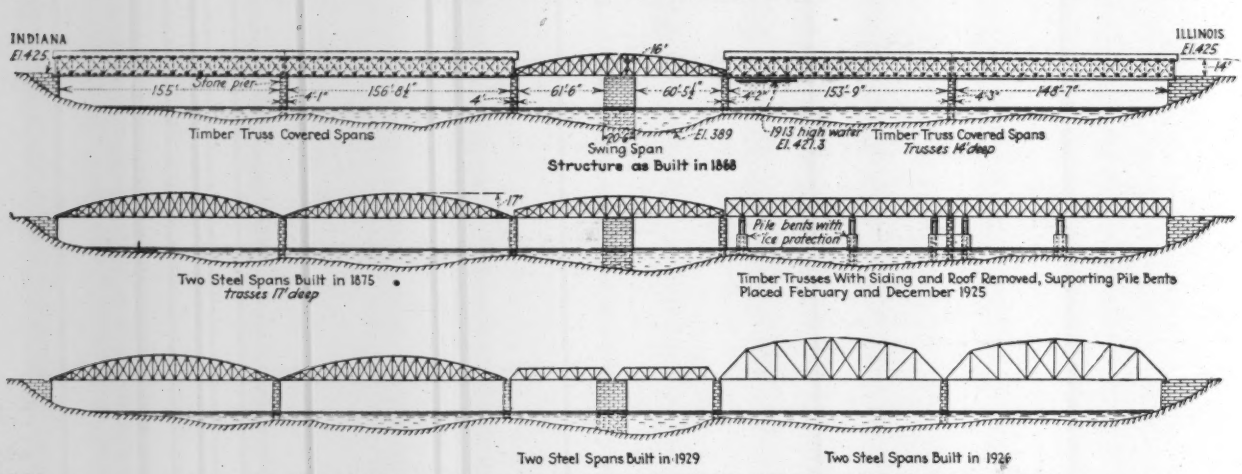


FIG. 2—STAGES IN THE LIFE OF THE WABASH RIVER BRIDGE AT VINCENNES, IND.
Top, original construction. Middle, bridge as altered in 1876 and 1925. Bottom, present structure.

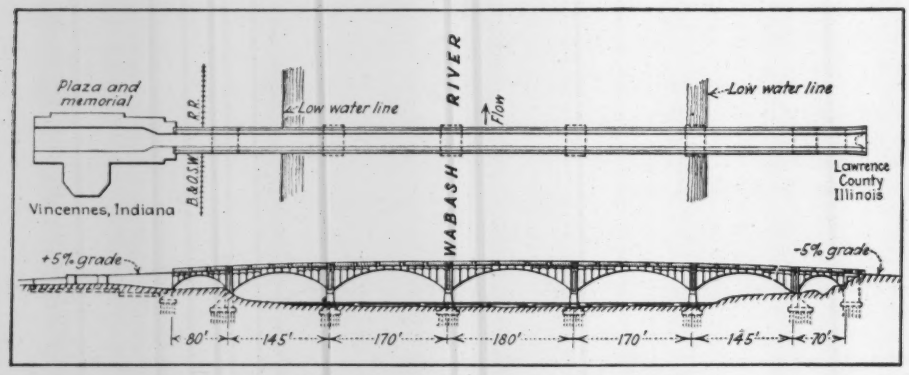


FIG. 3—PROPOSED CONCRETE ARCH BRIDGE
Memorial to George Rogers Clark, explorer.

can be completed, the two states agreed, as an emergency measure, to replace this old swing span with two low-truss fixed spans. This work was completed in October, 1929.

Features of Old Design—Little is given on the substructure construction in available reports. Records do not show the depth of the footings, the method by which the foundation excavation below water line was made or if the foundations are on timber piling or timber grillage. The stone masonry was built up of medium-size blocks of limestone and is still in good condition. In the original timber trusses, of the Howe type, there were counters in every panel. The members are said to have been poplar timbers. The upper chord was built up of three 8x9-in. timbers; the lower chord of four 5x11-in. timbers; the diagonals were composed of two 6x9-in. timbers, and the counters were each a single 6x6-in. timber. Pairs of $1\frac{1}{8}$-in. round rods formed the verticals. The floor was carried on transverse timber joists resting directly on the bottom chords. With trusses spaced 18 ft. c. to c. there was a clear roadway width of 16 ft.

The swing span was never protected from the weather by covering. Its top chord was composed of three 5x$\frac{1}{2}$-in. cast-iron plates on edge, bolted together but held apart by spacing blocks. The lower chord had two plates of the same size, similarly bolted and blocked. The floor was carried on transverse timber joists seated directly on the bottom chords. The verticals were pairs of $1\frac{1}{4}$-in. round rods. This is a combination Howe truss type, the diagonals being pairs of 5x7-in. timbers and the counters single 5x7-in. timbers. This span had a 16-ft. roadway. It is said that the timber diagonals and counters had been replaced a few at a time until few, if any, of the original timbers were in place when the structure was dismantled. This swing span was probably designed as a combination of center and rim bearing. The superstructure dead and live loads were transmitted to a framework of beams under the floor, and the drum was supported on small wide-rimmed wheels turning on axles radiating from a collar around the center. The rack and wheel track were in one piece, with rack and pinion on the outside. Operation was by man power, a crank being applied to a vertical spindle rising through the floor.

In the two bowstring trusses on the Indiana side, built in 1875, the top chords are composed of two 12x$\frac{1}{2}$-in. cast-iron plates, placed flat and blocked 18 in. apart by a system of double round-rod bridging. The lower chord has two 10x$\frac{5}{8}$-in. plates on edge, carrying the transverse timber floor joists directly. The verticals are of an obsolete section in the form of a cross, $2\frac{3}{4}$ in. on each axis, while the diagonals are $\frac{3}{4}$-in. round rods. These trusses have several panels of upper lateral bracing at the center of the span and light I-beam floorbeams or joists at alternate panel points. The clear roadway width is 16 ft.

Engineers

The reconstruction and repair work on the old structure and the plans for the new structure have been under the direction of William J. Titus, chief engineer of the Indiana state highway commission, with Fred Kellam, assistant chief engineer in charge of structures. Much of the information for this article was assembled by R. B. Yule, engineer of bridge surveys and investigations. For the Illinois division of highways, the work has been supervised by Frank T. Sheets, state highway engineer, and George F. Burch, bridge engineer.

Charges of Overpayment on San Gabriel Dam Contract Found to Be Unsupported

Board of Engineers Finds Little Difference Between Their Check of Excavation Quantities and Amounts Covered by Payment to Contractor—Minor Irregularities Charged to Board of Supervisors—Original Project Not Developed Along Engineering Lines

DISMISSING as unfounded the charges of gross irregularities made against the Los Angeles County flood-control district office in charge of E. C. Eaton, chief engineer, the consulting board appointed by the county grand jury went further into the general project and reported the original project poorly planned without due regard for fundamental engineering factors and charged several irregularities to the county board of supervisors. The consulting board, consisting of Porter H. Albright, R. V. Meikle and Franklin Thomas, was appointed on July 30, 1930 (see *Engineering News-Record*, Aug. 7, 1930, p. 224), following the publishing of an affidavit in the local press asserting that an independent survey of the abandoned Forks site indicated that the total yardage of excavation was not more than 500,000 cu.yd. This was the equivalent of stating that the official figure of 773,646 cu.yd., on which the settlement with the contractor was based, was an over-allowance of about 50 per cent. The accurate check survey of the board, however, verified the final settlement survey of the flood-control district engineer's office within 2.02 per cent, and this slight discrepancy was partly attributed to recent movements of loosened material.

After the original assignment of checking the excavation quantities, the grand jury requested the board to report also on the conditions and the sequence of developments resulting in the loss of a large amount of public funds and the abandonment of the dam project at the site. The latter assignment resulted in a thorough study of the plans and specifications for the original dam and a review of the entire project since the formation of the district. Parts of the report dealing with the project as a whole find that the structure originally planned would have created a 240,000 acre-ft. reservoir, that this was not economically justified, and that adequate flood control could be secured for approximately half the original bond issue of $25,000,000. By listing six omissions or irregularities on the part of the county board of supervisors, the report places much of the responsibility for the failure of the project on this body.

The complete summary of conclusions reached by the consulting board follows.

(1) The total quantity of excavated material was 749,858 cu.yd., of which amount 690,213 cu.yd. was within the pay line (designated No. 2) established Sept. 13, 1929, just prior to the slide causing the work to shut down.

(2) Total payment authorized by the board of supervisors was for 773,646 cu.yd., of which amount 83,433 cu.yd. was outside of pay line No. 2, according to our survey.

(3) Payment of excavation in excess of computed quantity within pay line No. 2, according to our survey, amounted to $246,127.35, and according to the flood-control district's survey, amounted to $204,213.75. This payment by the flood-control district also offset other claims made by the contractors.

(4) Movement of loosened material largely accounts for the difference of 14,208 cu.yd. (2.02 per cent) less in our computation of excavation within pay line No. 2 and the 704,421 cu.yd. reported by the flood-control district.

(5) Charges made of gross irregularities in the flood-control department report of excavated quantities are unfounded.

(6) Pay lines were not submitted to the board of supervisors for approval, as provided under the terms of the specifications and contract.

(7) Bids on total excavation under the contract were remarkably close, and had the project been completed on the basis of the specification quantities, Fisher, Ross, McDonald & Kahn, Inc., would have received approximately the same total for excavation as bid by the other contractors, but would have received their profit sooner.

(8) The contract price on mass concrete included a reasonable margin of profit.

(9) The specification quantities for excavation and concrete were inconsistent with each other and appear to be fictitious.

(10) Had larger quantities been specified according to the estimate submitted by the majority members of the consulting board, Fisher, Ross, McDonald & Kahn, Inc., would still have been low bidders.

(11) Foundation weakness is due to broken geological structure and not to over-blasting.

(12) No thorough and detailed geological study was made of the dam site prior to the time of shutting down work, except by a geologist employed by the contractor.

(13) A statement by former chief engineer in published report at time of bond election with respect to character of bedrock as indicated by core drilling had no basis in fact.

(14) At the time of the bond issue the project had been conceived without either restriction to flood-control needs, determination of foundation conditions, justification of reservoir capacity or other engineering factors that should have governed.

(15) Storage capacity of the structure under the contract was 240,000 acre-ft., while estimate of flood-control needs by Fowler, Marx and Paul was 105,000 acre-ft.; by Hawgood and Bell was 128,000 acre-ft.; and by J. B. Lippincott was 110,000 acre-ft.

(16) Had the structure been completed within the $25,000,000 provided in the bond issue, the project would not have been economically justified.

(17) A dam with adequate storage for flood-control purposes can be built for approximately half the amount of the bond issue.

(18) The amount paid to the contractors is only about half of the total expenditures to date. Other unjustifiable expenditures made prior to the determination of the feasibility of the project were for railroad, highways and camps.

(19) Omissions or irregularities by the board of supervisors were: (a) failure to have an independent geological and engineering check made of the project prior to the bond election; (b) ignoring of recommendation of Gen. George W. Goethals in matters of exploration, organization and means of reducing gambling element by placing flood control on a more scientific basis; (c) setting up dual authority and divided responsibility in the supervision of the project; (d) constructing railroad, highways, buildings and other works at a cost in excess of one million dollars prior to definite determination of feasibility of project; (e) award of boarding contract. (It is customary for contractors to board their own crews, as this is an important means of building up a satisfactory personnel in the organization. Construction camps are usually conducted at a loss, but this loss is generally regarded as a means to an important saving in the total cost to the contractor. The award of the boarding contract by the board of supervisors was irregular in that in served no economic need and would eventually have led to difficulties.) (f) General ignoring of sound engineering advice when not in harmony with preconceived scope of project, or which would have involved a modification of the program as originally proposed by the former chief engineer and supported by the majority of the board of supervisors.

The board's analysis of the bids and the contract indicated that the former were well balanced and that the latter was in good form. Particular attention was paid to those sections of the bids dealing with prices for excavation work, and the conclusion was reached that, although it was obvious the bidders had different plans for prosecuting the work, "had the job been completed, the

low bidder would have received approximately the same amount for excavation as bid by the other contractors."

Summarizing its study of the entire project from its inception, the board states, "It is clear that a policy was pursued from the beginning by the former chief engineer, supported by a majority of the board of supervisors, to build a dam of unprecedented size, without adequate investigation to determine what development and what expenditure the hydraulic, geological and economic conditions would justify. Instead of letting the conclusions be justified by an analysis of the governing factors, a location and size of dam were selected to fit a preconceived plan, and a case was built up in support of the selection. Well-qualified consulting engineers with years of successful experience on similar projects were retained from time to time, but generally with definitely restricted instructions. When any of the engineering reports recommended that the scope of the project be determined by further investigations, or that a structure of lesser size be constructed, or that there be a change in the administrative policy of the flood-control district, these recommendations were disregarded."

The history of the San Gabriel Dam project, through the years of controversy since the bonds were voted in 1924, has been reported in *Engineering News-Record* in the following major articles, which carry further references to minor notes: May 6, 1924, p. 1,088; June 3, 1926, p. 890; April 7, 1927, p. 570. The situation subsequent to the abandonment of the work, including the reports of the two official boards condemning the site, was reviewed in the issue of Dec. 5, 1929, p. 896.

Gas Welding in Structural Work Is Discussed

Stethoscope and Sound Amplifier for Tests—Extensive Welding of Pipe—Welded Residences

GAS WELDING as applied to structural steel occupied a large part of the annual meeting of the International Acetylene Association, held at Chicago on Oct. 12 to 14. In presenting a paper on "Experiments on Gas-Welded Structural Joints," Prof. James R. Griffith, of Oregon State College, stated that numerous test welds made by amateurs were of surprisingly good quality. A comparison of riveted and welded connections between angles and gusset plates indicates that there is little difference in the stress distribution under working load, but in tests to destruction the welded joints gave the better results.

Engineers cannot place reliance on welded joints without some knowledge of their character, and in actual erection work some joints are sure to be welded carelessly, even by expert welders. To detect such careless welds, Professor Griffith has made extensive experiments with a medical stethoscope, tapping the weld at various points and using an amplifier to magnify the sounds. He gave an interesting exhibition of this method, the various loud sounds coming from different parts of the welds resounding through the meeting room. He also illustrated the curious forms taken by sand on a welded plate which is tapped, indicating the good and bad portions of a weld.

The feature of inspecting welds in steel-frame buildings was dealt with also by F. Eder, of the Robert W. Hunt Co., who considered that field inspection or supervision of welding operations is the best means of insuring good work. By noting the practice and efficiency of the welders and watching each man systematically, the inspector can judge whether the required standard of work is being maintained. In addition, he can closely examine occasional completed welds, exploring the edges by means of a small chisel, or perhaps remelting a weld whose quality is doubted, although this last method cannot be applied as a regular procedure.

Nearly 100 cities and towns have adopted the structural welding code of the American Welding Society, according to H. H. Moss, of the Linde Air Products Co. Many other cities that are revising their building codes are considering similar action. At the present time standardization is being effected and the characteristics of development are along the lines of economic design rather than in details relating to unit stress and the technique of welding. Welded steel-frame construction for residence buildings was described by Eric H. Ewertz, consulting engineer, New York, who also advocated the welding of pipe work in such buildings in order to eliminate the troubles from leaky joints.

Developments in oxy-acetylene gas welding for oil pipe lines, city gas mains and factory and house piping were covered in several papers. In one of these, by R. E. Fritsch, Louisville, Ky., it was stated that all piping is to be welded in the extensive buildings for the New York Hospital and Cornell Medical College, which job will involve about 10,000 welds and the cutting of about 3,000 branch outlets. A 70-page printed report of the oxy-acetylene committee reviewed developments in welding and cutting in some 30 lines of manufacturing and industry.

Rail-joint welding to build up battered rail ends was dealt with in a paper by S. E. Tracy, of the Chicago, Burlington & Quincy Railroad, who pointed out that the weld metal should be slightly harder than the rail metal but not hard or brittle enough to break away. For this condition he considered gas welding superior to electric welding, supporting this opinion by records of the American Railway Engineering Association. The relative cost per weld he gave as 81c. for gas welding and $1.17 to $2 for electric welding, while the equipment for the former is also much less costly.

Large attendance and high-grade papers were notable features, the registration being 460, as against 350 in 1929 and 240 in 1928. Officers elected include: president, W. D. Flannery; vice-president, W. C. Keeley, Jr.; secretary, A. Cressy Morrison, all of New York.

Tree Roots Stop Flow in Service Pipe

Stoppage of a 1-in. lead service pipe under pressure by the growth of tree roots was recently observed at Detroit, Mich. The service was originally installed more than thirty years ago. It was provided with a branch for a sprinkler connection, but twenty years ago, during repair of a leak, the branch was cut off and plugged with a wooden plug. A complaint of short supply was recently investigated, and it was discovered that the plug had almost completely rotted away and that tree roots had entered the opening and grown to a length of about 2 ft., stopping the line almost completely. The roots were removed and the end of the branch was mashed shut to prevent further trouble.

Engineering Literature

A Monthly Review of Books and a Listing of New Publications

Life Expectancy of Physical Property

REVIEWED BY JOHN H. GREGORY
Consulting Engineer, Professor of Civil and Sanitary Engineering, Johns Hopkins University, Baltimore, Md.

LIFE EXPECTANCY OF PHYSICAL PROPERTY: Based on Mortality Laws—By Edwin B. Kurtz, C.E., Head of Department of Electrical Engineering, The State University of Iowa. New York: The Ronald Press Co. Cloth; 6x9 in.; pp. 205; 90 line cuts. $6.

IN THE preface to this book the author states: "The engineer and accountant concerned with valuation, appraisal and depreciation problems hitherto have had available for use no absolutely dependable tables of life expectancy for physical property. Such data as have been organized are admittedly opinions as to the probable average period of usefulness of different items of equipment. At best they are but the assumptions of the engineering and accounting professions. Strange as it may seem, few mortality data of physical property have been collected and presented in actuarial form." Recognizing the absence of mortality data, some fourteen years ago the author began to search out and compile such records as could be secured. As a result, a group of mortality tables was assembled, and the study and analysis of these tables have produced this book. The life characteristics of actual physical property were calculated and analyzed and such relations as could be readily discovered were noted. The main objectives of the book have been three: to establish mortality tables of physical property on an actuarial basis; to develop the life characteristics of different classes of physical property; and to develop the relations, and determine the laws, between the various life characteristics.

The first chapter deals with Mortality Data for Equipment and Machinery, in which certain data are presented in tabular and graphic form. The four following chapters deal with Methods of Compiling Mortality Tables, Development of Mortality Curve Types, Frequency Curves of Replacement of Original Units, and Equations of Seven Type Mortality Curves. The last three chapters treat of Average Life, Expectancy and Probable Life, and Annual Renewals.

For the mathematically inclined accountant and valuation engineer, the study which the author has made will be found very interesting; but for him who is not well grounded in mathematics, including calculus and differential equations, the sledding will be hard. The book is not an easy one to read, notwithstanding that it is well written, and concentration and close application to the subject matter are required.

That the book may be of great service in certain phases of accounting and valuation work, as for example in rate cases, the writer has no question, whereas, on the other hand, engineers engaged in other phases of valuation work will receive little if any help from it. In making this statement the writer has clearly in mind a recent water-works condemnation case with which he was connected, in which the property was valued at many millions of dollars, and with an intimate knowledge of the testimony presented by all of the engineers on both sides of the case, the writer cannot see how any of them could have received much if any assistance from this book had it then been available. This is not intended to be adverse criticism but just a statement of the writer's opinion and, again, the reader may ask himself if there ever will be any "absolutely dependable tables of life expectancy of physical property."

The book, really, is a mathematical study, based on actuarial methods and, from one point of view, might well be an excellent dissertation for a degree higher than that of Doctor of Philosophy. And, as a study, it is a most exceptional and interesting one.

The book is well printed and bound, and the charts are well prepared. Following the table of contents is a list of the charts and another one of the numerical tables, a feature greatly to be commended. The index is very brief (3 pp.). For the accountant and engineer interested in a mathematical research into the life expectancy of physical property the price of the book, $6, is very low, taking into account the immense amount of time which must have been expended by the author; but for the ordinary practicing engineer it would appear to be rather high, when compared with the average price of many valuable technical books of much greater length.

From a Wide Experience in Humanics

FOUNDATIONS FOR HUMAN ENGINEERING—By Charles R. Gow, Professor of Humanics at the Massachusetts Institute of Technology. Edited by F. Alexander Magoun. New York: The Macmillan Co. Cloth; 6x8 in.; pp. 226. $1.60.

RECOGNITION of the fact that the engineer must know how to deal with men as well as with materials if he is to succeed is one of the encouraging signs of the day. Some engineering schools have acted accordingly, but few if any have gone so far as to include human engineering in their courses. This has been done at one well-known institution following a series of annual lectures on human and professional relationships, provided for in 1923 by John E. Aldred. One of the lecturers, William E. Nickerson, after discoursing on knowledge plus wisdom, provided for a chair of humanics and chose to fill it a well-known engineer and contractor, Charles R. Gow, now postmaster of Boston. Some of Mr. Gow's lectures have been made into a volume, aptly named Foundations for Human Engineering, prefaced by an introduction by the editor and by Mr. Nickerson's address.

The many engineers who are fortunate enough to know Mr. Gow will agree that he was just the man to fill a chair of humanics at an engineering school; and those not so fortunate will join the others on reading this book.

Among Mr. Gow's homely but vital topics are honesty, loyalty, moderation and courtesy in conversation, friendliness, open-eyedness, sound judgment, initiative, well-directed push, personality, broader horizons and leadership. The book abounds with illustrative examples to drive home points being made, some of the most forceful being drawn from Mr. Gow's own and sometimes

bitter experience. Throughout it is made evident that the foundations of successful human relationship are self-knowledge, self-control and power to express oneself clearly and forcibly by voice and pen.

The book deserves to be read and discussed not only by all college professors and students but also by engineers, young and old.

Port of New York in Its Economic Role

REVIEWED BY BILLINGS WILSON
Assistant General Manager, Port of New York Authority

LE PORT DE NEW YORK DANS SON RÔLE ÉCONOMIQUE—Par Gaston Eyskens, M.S., Docteur en Sciences Commerciales, etc. Bibliothèque de l'Ecole des Sciences Commerciales de l'Université de Louvain. Louvain, Belgium: René Fonteyn. Paper; 6x10 in.; pp. 395; tables. $5.

MR. EYSKENS' work is a history of the commercial development of the port of New York and a résumé of the current plans for the development and improvement of its terminal facilities. It is based on two years of research work in this country and has been undertaken because of the author's feeling that the "astonishing audacity" of the port's gigantic terminal facilities is going to command the attention of the entire world and serve as a model for Europeans.

Part I is devoted to an analysis of the traffic and the economic functions of the port. In Part II, on the fundamental conditions which have brought about New York's commanding position in world trade, the author details the historical development and the natural and economic characteristics of the various world trade routes radiating from New York.

The natural geographic and hydrographic advantages of the port of New York are admirably stated. The facilities, equipment, and technical, commercial and administrative organization of the port district are outlined. Considerable attention is given to the creation, development, functions, responsibilities and achievements of the Port of New York Authority, which he designates as "the brain of the port." In his opinion the most urgent problem awaiting solution by this body, on behalf of the port as a whole, is that of local transportation. He points out the duplication of facilities and services of the various competitive transportation interests, each zealous of the maintenance of its independence "in a land wherein individual freedom of action is exalted to the rank of an infallible dogma." Under such circumstances, the author says, there is extensive need for modification of existing methods of procedure with a view to securing higher efficiency and consequent reductions in the cost of terminal operations. He declares that it "is above all essential that the port of New York in its extensions be guided by a systematic plan which will enable it in the future to avoid errors of the past."

Part III probably represents the author's chief interest. It is devoted to a discussion of the larger problems of the future that are confronting the port of New York, including the reorganization of transportation facilities, the logical development of shorefronts and ship channels, and the nature and effect of terminal charges. Interport competition; freight rates and port differentials are discussed at some length along with the American policy of protective import tariffs. The author analyzes the probable effect on New York of projected new tidewater outlets from the interior of North America, including the Hudson Bay Railroad, Great Lakes-Atlantic Ship Canal and the control and regulation of the Mississippi.

The book contains a splendid bibliography that is a valuable index of current literature and information on the port of New York and related subjects.

The physical make-up of the book is in keeping with the high standards of all publications of the University of Louvain, exhibiting a perfection of bookcraft that is all too uncommon in this country, where the book makers' art is shackled by compulsory mass production. To those who have the facility or patience to cope with the French language the book will prove a highly interesting and readable addition to their libraries. The author is something of a stylist and the form of the work is narrative.

The reviewer has long nursed a secret ambition to undertake a similar work, but feels that the problem has now been reduced to a matter of translation.

Recognizing a Change in Emphasis

ROUTE SURVEYING [Formerly Textbook on Railroad Surveying]—By George Wellington Pickels, C.E., M.Am.Soc.C.E., Associate Professor of Drainage Engineering, and Carroll Carson Wiley, C.E., M.Am.Soc.C.E., Associate Professor of Highway Engineering, University of Illinois. New York: John Wiley & Sons. London: Chapman & Hall. Flexible; 4x7 in.; pp. 380; $3.50.

TRADITIONALLY, instruction in surveying in most engineering schools progresses through courses in plane and topographic surveying to culminate in a course in railway surveying, the latter having been accepted as representative of the special type of work most frequently encountered in actual practice. Of late years railway location and construction have declined, while pipe lines, canals, transmission lines and highways have become major construction industries. Although the methods followed in the latter fields are basically similar to those used in railway work, it now seems logical that the older courses in railroad surveying should be extended to include highway and other route surveys.

To serve as a textbook for such a course, and also for the use of the practicing engineer, the authors of this volume have rewritten and enlarged their "Textbook on Railroad Surveying" and have changed its title to "Route Surveying." The change in title is reflected in the contents of the book, which follows the usual handbook arrangement, progressing successively through the subjects of reconnaissance, preliminary and location maps, curvature and grades, circular curves, spirals and parabolic curves, turnouts, and the computation of earth work. Each of these subjects is first discussed as it affects railway location, and subsequently modified to conform with special conditions in the fields of highway, pipe line, canal and transmission line construction and location. The subject matter is clearly and logically presented, with detailed mathematical solutions omitted. The last third of the volume is taken up with the usual tables for field use.

German Sludge-Removal Equipment

FLACHBECKENKLÄRANLAGEN MIT SCHLAMMKRATZERN—Von Dr.-Ing. Max Prüss, Marinebaurat a.D., Vorstand des Abwasseramtes der Emschergenossenschaft in Essen. Paper; 8x12 in.; pp. 5; halftones and line cuts. Reprint from "Gesundheits-Ingenieur," 1930, 18 Heft. Munchen and Berlin: R. Oldenbourg.

THE author outlines the better known types of continuous sludge-removal equipment in use in Germany. A two-story settling basin 30 in. in diameter has been built with a shallow settling compartment and a relatively large chamber for sludge because of the bulky character of the sludge obtained. Sludge scrapers of the rotary

type have their weight supported by large pontoons floating on the surface, and are hinged at the point of attachment so as to allow for irregularities. A basin 45 m. in diameter is proposed, which will be of the radially outward-flow type. The rotary sludge scrapers will operate on only an inner circular portion of about 35-m. diameter. The outer portion of the chamber, in which the finest material will settle, will be cleaned by a separate set of scrapers, moving at a much lower speed and supported by a small traveling crane. Four sludge hoppers are provided in the outer compartment, from which the sludge can be piped to the main sludge chamber.

Hydrogen-Ion Measurements

REVIEWED BY JOHN R. BAYLIS
Physical Chemist, Bureau of Engineering, City of Chicago

THE MEASUREMENT OF HYDROGEN-ION CONCENTRATION—By Julius Grant, Ph.D., M.Sc. (Lond.), A.I.C. London, New York and Toronto: Longmans, Green & Co. Cloth; 6x9 in.; pp. 159; illustrations and diagrams. $3.75.

PRACTICALLY no industry whose processes involve aqueous solutions can operate at greatest efficiency without a knowledge of the hydrogen-ion concentration of the solution. While it has not proved a panacea for all troubles, as some had hopes that it would be, it serves, as the author of this book states, as a cure for many ills if applied with judgment in conjunction with other factors. The pH test has become of great value in water treatment.

The author states that there is need for a book giving the shortest and simplest account of the theoretical side of the subject consistent with the needs of the worker. He has succeeded very well in the production of such a book, though it seems a little too brief. The 29 pp. on theory give a very clear and concise explanation of hydrogen ions. The 46 pp. on the electrometric method of measuring the hydrogen-ion concentration give a fairly good idea of the theory of the hydrogen electrode. Only 25 pp. are devoted to the colorimetric method in Part III, and as this is the method used almost exclusively in water purification, the treatment as given by the author is entirely too brief. The theory of indicators is good, and the description of how comparisons are made with color indicators gives some idea of how the standards are used, but no information is given on how to prepare such standards. The section on methods and technique applicable to particular cases is entirely inadequate in its treatment of water, though fairly good for some of the other subjects. Only two pages are devoted to water and less than one-half of this relates to the pH of potable water. Several tables at the end of the book add to its usefulness.

If a person trained in chemistry wishes to gain a general knowledge of hydrogen ions and how such tests are made, the book is excellent. For the practical waterworks laboratory worker the book is too brief to be of great value.

Metering Engineering Education

OBJECTIVE TYPE TESTS IN ENGINEERING EDUCATION as Applied to Engineering, Drawing and Descriptive Geometry—By Clair V. Mann, B.S., C.E., Ph.D., Professor of Engineering Drawing and Descriptive Geometry, Missouri School of Mines and Metallurgy, M.Am.Soc.C.E., Soc.Prom.Eng.Ed. Published for Engineering Foundation, Inc. New York and London: McGraw-Hill Book Co. Cloth; 6x9 in.; pp. 122; line cuts, halftones and charts. $2.75.

PRECISION in measurement, which has contributed so much to the engineer's knowledge of materials and their uses, has been conspicuous by its absence in the field of engineering education. Development of a scientific, impersonal and impartial system which would measure aptitude and accomplishments of the individual student would have startling results. From the point of view of the student such a system would, by giving an unbiased, impersonal rating of his accomplishments as compared with his fellows, intensify the spirit of competition. Applied to an entering student, it would reveal natural aptitudes and disabilities which would surely affect his career, both in college and afterward. The instructor would benefit by securing, by reflection from individual ratings, a check upon the efficacy of his methods, and by the ability to segregate individuals of differing mentalities into sections of a more homogeneous nature.

Unfortunately the development of an ideal rating system is far from simple. The task has been taken up by a number of leaders in engineering education, and is progressing perceptibly, but there is still much to be done. What has been accomplished in general and, more particularly, in the fields of engineering drawing and descriptive geometry, is told in detail in Professor Mann's book, which is sponsored by Engineering Foundation. Many data are given on the preparation, classification, administration, marking and interpretation of a series of tests in these subjects developed by the author and now in use at the Missouri School of Mines and Metallurgy.

Inspection of Construction

INSPECTION OF THE MATERIALS AND WORKMANSHIP EMPLOYED IN CONSTRUCTION: A Reference Book for the Use of Inspectors, Superintendents and Others Engaged in the Construction of Public and Private Works—By Austin T. Byrne, C.E., Author of "Highway Construction," Revised by Samuel T. Goldsmith, Assoc.M.Am.Soc.C.E., Instructor College of the City of New York. Fourth edition. Chicago: Gillette Publishing Co. Boards, cloth back; 5x8 in.; pp. 244; tables and line cuts. $3.

THIS compact volume is more than the title indicates; it is really a handbook for engineers, superintendents, foreman and others directly engaged in construction, as well as the inspector. Nearly all classes of construction are considered, including excavation, steelwork, concrete and building construction. In defining the duties of inspectors and describing the characteristics of materials employed and the methods of preparing them the author has prepared a manual that amounts to a brief summary of construction procedure. Parts of the work are extremely elementary, but this in no way detracts from its usefulness. The book is unattractive and hard to read because of its typography, consisting of reduced replicas of typewritten pages. Previous editions appeared in 1898, 1902 and 1911.

Enemies of Timber

TERMITES AND TERMITE DAMAGE, with Preliminary Recommendations for Prevention and Control—By S. F. Light, Professor of Zoology; Merle Randell, Professor of Chemistry, University of California, and Frank G. White, Chief Engineer Board of State Harbor Commissioners, California. Berkeley Calif.: Agricultural Experiment Station. Paper; 6x9 in.; pp 63, halftones and line cuts.

MANY an engineer knows to his sorrow the damage to timber structures wrought by termites. Much has been printed about them. The latest words on the subject are given in the pamphlet listed above, which is a revision and extension of an earlier publication with the same title. For the information presented thanks are due to the Termite Investigations Committee, working in co-operation with the University of California

After an account of the natural history of termites and the damage they do, the pamphlet has a section on prevention and eradication by chemical treatment and another on prevention by methods used during construction, the latter illustrated by line cuts.

From the biological section of the report it appears that termites are a very ancient family, related to cockroaches, but probably "distinct for many million years." Termites are "commonly but erroneously called 'white ants,'" but they are not ants and are not always white. Termites are "social insects," living in separate inclosed colonies, in darkness. At most they have only "vestiges of eyes." They are divided into three classes: reproductive, worker and soldier. The workers have mandibles "adapted to cutting off little fragments of wood." The soldiers have elongated heads, "covered with a hard, thick armor and armed with greatly enlarged, elongated and often grotesquely toothed jaws used as weapons of defense." Many other particulars of these peculiar insects are given in the pamphlet.

Materials of Today

JOHNSON'S MATERIALS OF CONSTRUCTION—Rewritten by M. O. Withey, Professor of Mechanics in the University of Wisconsin, and James Aston, Metallurgist with the A. M. Byers Co., of Pittsburgh. Edited by F. E. Turneaure, Dean of the College of Engineering of the University of Wisconsin. Seventh edition. New York: John Wiley & Sons, Inc. London: Chapman & Hall, Ltd. Cloth; 7x9 in.; pp. 848; tables; many helftones and line cuts. $6.

TEXT-BOOK OF THE MATERIALS OF ENGINEERING—By Herbert F. Moore, M.Am. Soc. Testing Materials, Research Professor of Engineering Materials, Engineering Experiment Station, University of Illionis. With a Chapter on Concrete by Harrison F. Gonnerman, and a Chapter on the Crystalline Structure of Metals by Jasper O. Draffin. Fourth Edition. New York and London: McGraw-Hill Book Co., Inc. Cloth; 6x9 in.; pp. 409; tables, halftones and line cuts. $4.

IN COMMON with equipment and with construction and design methods, the materials of engineering are in a constant state of change. New materials are introduced and knowledge of old materials increases. Beliefs and theories are altered. It is not surprising, therefore, to have two of the best-known books in the engineering materials field appear in new editions.

Johnson's Materials of Construction was first published in 1897. For nearly twenty years it was used extensively without revision (the author having died in 1902). In 1918 Professor Turneaure and his colleagues made a radical revision of the book, maintaining the broad scope of the first edition, but condensing some of the information, since it was available in other textbooks on mechanics, structural design and reinforced concrete which had then recently been published. At the same time the new edition aimed "to provide the essential information concerning the sources, manufacture or fabrication of the principal materials; to give carefully selected data covering the more important mechanical and physical properties, and the influences of various factors upon these properties; to show the causes of defects and variations, and how they may be discovered; to furnish an acquaintance with the technique of testing materials, and to present to the student some of the more general uses of the different materials." The present edition, the seventh, retains the same aim. The chapters on timber have been revised and rewritten to include the new working stresses and grading rules. Chapters on the methods of testing hydraulic cement and those dealing with the making and physical properties of mortar and concrete have been revised in the light of present knowledge of the water-cement ratio. Other revised chapters are those on portland cement products and non-ferrous alloys.

The fact that Professor Moore's Materials of Engineering has reached a fourth edition within twelve years gives some idea of the rate of change occurring in the engineering materials field. Originally written as an elementary text for technical schools, the book continues to be useful in this service, but at the same time it has been broadened in its scope and treatment, thus becoming more useful to the practicing engineer.

An example of this broadening is exhibited early in the book, where the chapter on failure under repeated stress in the original edition is replaced by three chapters, treating respectively elastic failure, failure by flow or creep and failure by fracture. The author is an acknowledged authority in this field of materials behavior, and this part of the work, consequently, is particularly useful. Another example of this broadening is afforded by an entirely rewritten chapter on specifications. Testing and inspection methods also reveal advances. Values for strength, ductility and other physical properties of materials have been revised as a result of extensive work in our research laboratories. A new chapter on the crystalline structure of metals, by Prof. J. O. Draffin, of the University of Illinois, exemplifies the recording of new knowledge in this highly important field. As in Johnson's book, timber, concrete and methods of testing have been revised in the light of present knowledge.

A casual comparison of the table of contents of these two books seems to indicate that they are quite different in subject matter, whereas analysis of the subject matter itself shows that the books contain quite closely comparable data. Moore's book is the more concise of the two, one example being his treatment of cement in one chapter, whereas four chapters are devoted to the subject in Johnson's. Iron and iron alloys take up four chapters in Moore's and nine chapters in Johnson's. Both books will continue to rank high in usefulness.

Geology of Underground Water Supplies

REVIEWED BY I. GUTMANN
Associate Editor, Engineering Index, New York City

ESSAI D'HYDROGEOLOGIE: Recherche, Étude et Captage des Eaux Souterraines—Par Le Dr. Ed. Imbeaux, Ingénieur en Chef des Pontes et Chaussées, Membre du Consell Supérieur d'Hygiène Publique de France. Paris: Dunod, 92 Rue Bonaparte (VI). Paper; 8x11 in.; pp. 678; tables; 352 linecuts, 284 francs.

IT IS rather difficult to classify this imposing volume. Based upon lecture courses given by an eminent French hydraulic engineer at the Ecole des Ponts et Chaussées and at the Conservatoire des Arts et Métiers, one might assume that the book is an engineering text; on the other hand, the scope and the character of the material presented entitle it to a place of honor in physiographic literature.

The first quarter of the book outlines the principles of underground water geology; the remaining three-quarters are devoted to a hydrogeology of Europe and North America. The first section contains chapters on the geology of rocks and soils, the laws of movement of underground waters, underground basins and springs, and a rather brief treatment of the physics, chemistry and biology of underground water supplies. A fairly complete and up-to-date study of methods and instruments for water prospecting and measurement of underground flow is included in this section. A number of European electrical instruments, hardly known in America, are described. To American readers this may

prove to be one of the most interesting portions of the book, since the rest of the first part is largely a summary of well-known studies by American, German and French hydrologists, such as Slichter, King, Van Hise, Thiem, Dupuit and others. It is gratifying to note the truly pre-eminent part American field observers and theoretical investigators have played in the development of underground hydrology.

As mentioned before, the great bulk of the book treats concretely of the water geology of Europe and North America. Numerous graphical and descriptive data are presented under the headings of geological formation and geographical divisions. A surprisingly large proportion of this unrivaled collection of hydrogeological data is devoted to regions in the United States; no doubt on account of the rich literature published by the geological surveys of our federal government and individual states. It is to be regretted that this portion of the book is not supplied with an adequate bibliographic list of references. In general, bibliography is rather scantily indicated in footnotes and only a geographical index is supplied.

This treatise is undoubtedly a labor of love crowning a distinguished professional career of 40 years of engineering instruction. It is a work which the engineering profession should prize and may well be proud of, even if its scope far exceeds the ordinary necessities of a practicing engineer.

For Better English

A HANDBOOK OF ENGLISH IN ENGINEERING USAGE—By A. C. Howell, Associate Professor of English, University of North Carolina. New York: John Wiley & Sons, Inc. London: Chapman & Hall, Ltd. Cloth; pp. 286. $2.50.

MORE and more it is becoming evident that engineers are paying greater attention to the manner in which they present their thoughts and formulate their reports. The better they can express themselves in clear, accurate and concise language the surer they are to rise in their profession. To the many books that have been published in the last two or three years to aid them in that respect is now added this one by Professor Howell. It is designed, the author says in his preface, to be used as a handbook by the practicing engineer and also as a textbook in colleges. It outlines the general characteristics of engineering writing, points out common errors to be avoided, tells how to write a business letter and gives advice on the formulation of a report. There is also a chapter on how to write an article for publication in a technical magazine. The book is replete with valuable suggestions and examples and is one that could with advantage be kept for ready reference on every engineer's bookshelf.

Constructive Research

SPECIAL ASSESSMENT PROCEDURE: A Critical Study of the Methods and Practices Employed in Improvement Finance in Twenty-One New York Cities—Special Report No. 1, New York State Tax Commission, Albany, N. Y. By Arthur Rowland Burnstan, Ph.D., New York State Fellow in Taxation at Columbia University, Research Investigator, New York State Tax Commission. Paper; 6x9 in.; pp. 272; line cuts, tables and folding maps.

FISCAL PROBLEMS OF RURAL DECLINE: A Study of the Methods of Financing the Costs of Government in the Economically Decadent Rural Areas of New York State—Special Report No. 2, New York State Tax Commission, Albany, N. Y. —By Ralph Theodore Compton, Ph.D., New York State Fellow in Taxation at Yale University; Research Investigator, New York State Tax Commission. Paper; 6x9 in.; pp. 283; folding maps.

TO THROW light on taxation problems the New York state tax commission has established fellowships in four leading universities. The two theses here noted justify the plan and give rise to hopes of equally good results from the two other fellowships.

Dr. Burnstan's Special Assessment Procedure reviews the subject broadly in order to throw light on practice in 21 cities of New York State, which is given in detail. The local studies show large opportunities for reform, some of which doubtless exist in many other cities. Emphasis is laid on the fact that benefit assessments are quite generally mere pro rata allocations of cost, with no real consideration of benefits to specific properties. The author does not go far toward suggesting a proper method of determining real benefits to specific plots of land due to this or that improvement, but he sets forth the fundamental principles that should be followed and outlines the procedure, from initiating an improvement to collecting the benefits assessed. The author quite overlooks, even in his bibliography, some of the earlier studies of financing public improvements properly subject to benefit assessments, including the Brockton sewerage report, made nearly 40 years ago. (See *Engineering News*, 1894, II., pp. 51 and 53, for lengthy abstract and editorial comment.)

Dr. Compton's Fiscal Problems of Rural Decline is likewise a study that merits attention outside New York State. He is brave enough to propose the abolition of towns (which in New York State are chiefly sparsely populated rural areas) and the combination of groups of weak counties into one. Functions now exercised by the towns, such as tax assessment and collection, highway construction and maintenance, would go to the counties, as also district and town schools. A state "land utilization program," to put idle, unproductive land at work, is proposed; also a careful scrutiny of every proposed addition to state aid that might either expand the "agricultural margin" or arrest its contraction within "forest or waste land zones."

For the Defense

THE SKYSCRAPER: A Study in the Economic Height of Modern Office Buildings—By W. C. Clark, Economist and Vice-President, S. W. Straus & Co., and J. L. Kingston, of Sloan & Robertson, Architects. New York and Cleveland: American Institute of Steel Construction. Boards, cloth back; 6x9 in.; pp. 164; line cuts, halftones and tables. $2.

THE skyscraper has been subject to attack ever since the advent of steel skeleton-frame construction 40 years ago. As improvements in construction and equipment have gone on buildings have become taller and taller. Adverse criticism has mounted in like degree. Critics—in many cases violent in protest—have urged that the skyscraper is uneconomic, a dire threat to public health and safety and a creator of traffic congestion that will soon be intolerable.

The authors of this book come to the defense of the skyscraper along all four of these lines of attack. Most of their space is devoted to the economics of the subject, considered in both its private and its public aspects—chiefly the former. It is in a part of their presentation of the "private owner's viewpoint" that the authors have made their most distinct contribution to the subject, able advocates for the defense as they are all through. This contribution is a study of the economic height of a hypothetical skyscraper, located on an entire city block in the congested and high-land value district south of the Grand Central Terminal, New York City. Eight possible buildings, ranging from 8 to 75 stories in height, were designed and their costs and rental values estimated with the aid of various specialists. The conclusion reached is

that on this site 63 stories would be the economic limit, with land values of $100 to $300 a square foot, but that at $400 a 75-story building might pay.

It would be easy to criticise some of the premises of this economic-height study and of the defense made of the four lines of attack previously mentioned, but we prefer instead to commend the whole book to the study of the many engineers and city planners interested in tall buildings and the problems they create. Such study will be well worth while. It is needed because the skyscraper is becoming more in evidence every day, both in numbers and in height; has much both to commend and to condemn it; must be regulated—but just how and with what effect on many other city problems has not yet been fully determined.

Electric Street Lighting

STREET LIGHTING PRACTICE—By Ward Harrison, Director of Engineering, Edison Lamp Works, O. F. Haas, Assistant General Manager, Atlantic Division, and Kirk M. Reid, Engineering Department Edison Lamp Works, National Lamp Works of General Electric Co. New York: McGraw-Hill Book Co., Inc. Cloth; 6x9¼ in.; pp. 264; halftones, line cuts and tables. $3.50.

STREET lighting has grown so in importance and complexity as to warrant a comprehensive book on the subject. This has now been provided by two specialists in electric lighting—which now dominates this field; except for a few brief historical statements the book contains nothing on gas lighting. After preliminary matter the authors take up arc and incandescent lamps, reflecting, refracting and diffusion media, series and multiple systems, visibility, zoning and many other phases of a street-lighting system. Attention is given to maintenance work, operating cost, financing, contracts and specifications, illumination measurements and calculations and the fundamental principles of street lighting. Many candlepower distribution curves are given. The book promises to have a wide field of usefulness.

Photo-Elastic Stress Analysis

DÉTERMINATION EXPÉRIMENTALE DES EFFORTS INTÉRIEURS DANS LES SOLIDES—Par Augustin Mesnager, Mémorial des Sciences Physiques Publié sous le Patronage de l'Académie des Sciences de Paris. Paris: Gauthier-Villiars et Cie. Paper; 7x10 in.; pp. 82; 71 line cuts. 15 francs.

THE photo-elastic method of stress analysis used by various investigators is explained in detail in this monograph. Several applications of this method are made to difficult problems of elasticity whose solutions are known. Problems which cannot be treated by this theory are attacked and certain assumptions underlying the strength of materials are discussed. The purely optical method without contact measurements developed by Henry Faure is only mentioned in this monograph, the author preferring to use the photo-elastic method. A considerable part of the volume was published in *La Technique Moderne*, March 15, 1924.

Another Useful Who's Who

WHO'S WHO IN RAILROADING: United States-Canada-Mexico-Cuba (Formerly the Biographical Directory of Railway Officials of America)—1930 Edition. New York: The Simmons-Boardman Publishing Co. Cloth; 6x9 in.; pp. 579. $8.50.

ENLARGED in scope and with promise of publication at shorter intervals hereafter, the time-honored and useful Biographical Directory of Railway Officials of America now appears with the title Who's Who in Railroading. The new Who's Who includes "men who, while not actually employed by railroad companies, are nevertheless railroad men in the broad sense of the term —leaders among the manufacturers of railway equipment and supplies, railway economists, regulatory authorities and others whose work ties them closely to the railway industry." It also includes more information about the men, outside their railway activities, than did the Directory. Some 4,000 names are included.

Publications Received

PAINTS AND VARNISHES FOR WOOD PROTECTION, with exposure tests of a great variety of materials, are dealt with in a report by George M. Hunt, U. S. Forest Products Laboratory, on "Effectiveness of Moisture Excluding Coatings on Wood" (Circular 128, U. S. Department of Agriculture, Washington, D. C.). Free copies are available.

FOUR YEARS' DOINGS of the State Roads Commission of Maryland are covered in a report of the commission dated Oct. 1, 1930, a bound volume of 270 pp., including many halftone views. A feature of the report is a review of state road making in Maryland since 1906, accompanied by a number of folding colored maps. Harry D. Willard, Jr., Baltimore, is chief engineer of the commission.

PORTLAND CEMENT IN SPAIN during 1929 is the subject of a government publication, in Spanish, that has just reached this country. Statistics on production and use, together with halftone views of cement plants and of construction work on which cement was used, are included. The pamphlet was prepared by the regulatory and inspection committee of the cement industry of the Ministry of Fuel, the president of which is Antonio Lasierra y Purroy. For copies address the Ministerio de Fomento, Madrid, Spain.

BEACH PROTECTION STRUCTURES, their construction and effectiveness, are discussed in considerable detail in a 129-p. illustrated report of the New Jersey state board of commerce and navigation (Trenton, N. J.), prepared by Victor Gelineau, director and chief engineer of the board. The subject matter is presented by the "case method," taking up in detail coast-protection operations at various points in the state. This part of the volume is preceded by a general discussion of the growing importance of beach protection and of the classes of structure used.

WHO'S WHO IN ENGINEERING, which has proved to be a useful directory, is to be brought out in a third edition as soon as the necessary material can be gathered and printed. An advisory committee to aid the publishers in selecting those to be included in the new edition has been formed with the aid of Engineering Council. The committee is headed by R. F. Schuchardt, Commonwealth Edison Co., Chicago. There were some notable omissions from the two earlier editions, explainable in part by the newness of the enterprise. Now that this Who's Who is well established and is under the auspices indicated the old gaps should be filled. The editor of the book is W. S. Downs, 80 East Eleventh St., New York City.

New Books and Revised Editions

[Those desiring copies of the books listed below or mentioned elsewhere in this section should order them from the publishers or from their local booksellers.]

A.S.T.M. TENTATIVE STANDARDS, 1930—Paper; 6x9 in.; pp. 864; illustrated. $7 in paper or $8 in cloth, from American Society for Testing Materials, 1315 Spruce St., Philadelphia, Pa.

Among the 155 standards listed there are 25 on metals; 16 on cement, lime, etc.; and 25 on road and paving materials.

BAUKRANE: Ein Handbuch für Bauausführende und Krankonstrukteure mit dem Besonderen Ziele der Vermittlung Zwischen den Bedürfnissen der Baustelle und den Erzeugnissen der Kranbauindustrie—Von Dipl.-Ing. R. Cajar, Magistratsoberbaurat in Berlin. Munich and Berlin: R. Oldenbourg. Cloth; 7x10 in.; pp. 275; 354 illustrations, mostly line cuts, 6 plates. 18 marks.

BOILER HOUSE MANUAL: Containing Hints, Tables and Formulas for Boiler Plant Attendants—By B. Frisby. London: Crosby Lockwood & Son. Cloth; 5x8 in.; pp. 64, 2s.

CARPENTRY MATHEMATICS Part I—By J. Douglass Wilson, Head of Building Trades Department, Frank Wiggins Trade School, Los Angeles, Calif., and Clell M. Rogers, Related Mathematics Instructor, Venice High School, Calif. New York and London: McGraw-Hill Book Co. 6x8 in.; pp. 232; halftones, line cuts and tables. $1.80.

Essential mathematics necessary for the working carpenter, both in actual construction and in business relations with banks and materials men. The subject of estimating touched upon to some extent, is to be amplified in a supplementary volume. Prpared primarily to serve as a text in vocational high school courses.

COUNTY GOVERNMENT AND ADMINISTRATION—By John A. Fairlie, Ph.D., Professor of Political Science, University of Illinois, and Charles Mayard Kneier, Ph.D., Associate Professor of Political Science, University of Nebraska, New York: The Century Co., Cloth, 6x9 in.; pp. 585; $4.

DESIGN OF STEEL STRUCTURES—By Leonard Church Urquhart, Professor in Charge of Structural Engineering, and Charles Edward O'Rourke, Assistant Professor of Structural Engineering Cornell University. New York and London: McGraw-Hill Book Co. Cloth; 6x9 in.; pp. 448; halftones, tables and many line cuts. $5.

DETAILING AND FABRICATING STRUCTURAL STEEL—By F. W. Dencer, Assistant Division Engineer American Bridge Co. Second edition. New York and London: McGraw-Hill Book Co. Cloth; 6x9 in.; pp. 441; halftones, tables and line cuts. $5.

Revised, new material added and type reset. The first edition, which was reviewed at length and favorably in these columns for Jan. 15, 1925, p. 122, has been translated into German.

THE DETERIORATION OF STRUCTURES IN SEA WATER—Eleventh (Interim) Report of the Committee of the Institution of Civil Engineers. [Under the Auspices of the British Department of Scientific and Industrial Research.]—Edited by John Purser, Assoc.M.Inst.C.E., Secretary of the Committee, and H. J. Grose. Paper; 6x10 in.; pp. 24.9d. from His Majesty's Stationery Office, London. or from British Library of Information, 5 West 45th St., New York City.

Contains summary report by the committee, and short progress reports on exposure tests of painted and of tarred steel plates, timber protection and reinforced concrete.

EXPERIMENTAL RESEARCHES OF TURBINE PUMPS—By Masanao Yendo, Dr. Engr. Yokohoma, Japan: Yokohoma Technological College. Paper; 8x10 in.; 96 pp. of text, diagrams and tables; 145 plates, some folding.

These researches were begun in 1914 at the Kyushu Imperial University when the author was instructor there, and appear to have been continued there or else lately resumed. Experiments have also been conducted at the Yokohoma Technological College. "The main object was to measure the mean actual absolute velocity and the direction of flow of water at the exit of the impeller." The single-stage pumps were used, an ordinary 8-in. commercial pump at Kyushu and a specially built pump at Yokohoma each with several different kinds of impellers and diffusers.

DAS GESETZ DES GESCHIEBEABRIEBES—Von Dr.-Ing. Ferdinand Dull, Regierungsbaurat. Berlin: Wilhelm Ernst & Sohn. Paper; 7¾x10¾ in.; pp. 62; tables, line cuts and halftons. $8.40 reichsmarks.

Describes experiments on the attrition of stream detritus. Pieces of marble and limestone in the form of cubes and parallellopipeds were placed in a rotating steel drum in company with natural detritus and the reduction in weight of the various pieces correlated with the peripheral travel of the drum. An exponential expression is evolved giving the weight of a piece of gravel at any time in terms of its inital weight, its length of travel and coefficients depending on the character of the material.

INDUSTRIAL RELATIONS IN THE BUILDING INDUSTRY:—By William Haber, Ph.D., Associate Professor of Economics, Michigan State College. Cambridge: Harvard University Press. Cloth; 6x9 in.; pp. 591; $5.

IRRIGATION REQUIREMENTS of the Arid and Semi-arid Lands of the Columbia River Basin—By Samuel Fortier, Principal Irrigation Engineer, and Arthur A. Young, Assistant Irrigation Engineer, Division of Agricultural Engineering, Bureau of Public Roads. Paper; 6x9 in.; illustrations and tables. 15c. from Superintendent of Documents, Washington, D. C.

THE MODERN DOWSER: A Guide to the Use of the Divining Rod and Pendulum—By Le Vicomte Henry de France. London: G. Bell & Sons, Ltd. Cloth; 5x8 in.; pp. 135; halftones and line cuts. 3s. 6d net.

POPULATION PROBLEMS—By Warren S. Thompson, Director of Scripps Foundation for Research in Population Problems, Miami University. [McGraw-Hill Publications in Sociology]. New York and London: McGraw-Hill Book Co. 6x9 in.; pp. 462; graphs and tables. $3.75.

RAILROAD VALUATION AND FAIR RETURN: A Study of the Basis Rate and Related Problems of Fair Return for American Railroads—By Shao-Tseny Wu, Ph.D., Traveling Fellow in Railway Economics, Ministry of Railways, Republic of China. Philadelphia: University of Pennsylvania Press. Cloth; 6x9 in.; pp. 233. $3.

RENSSELAER POLYTECHNIC INSTITUTE: A Short History, by Palmer C. Ricketts; After One Hundred Years, by Ray Palmer Baker. For copies, address the institution named, at Troy, N. Y. Paper; 6x9 in.; pp. 28.

Contains not only many interesting facts regarding this pioneer in engineering education, its founder, notable instructors and students, but also many data on early teaching of the sciences.

STRUCTURAL THEORY AND DESIGN: Theory—By Hale Sutherland, A.B., S.B., M.Am.Soc.C.E., and Harry Lake Bowman S.M., M.Am.Soc.C.E. New York: John Wiley & Sons, Inc. London: Chapman & Hall, Ltd. Cloth; 6x9 in.; pp. 318; tables and many line cuts. $3.50.

STUDIES IN REINFORCED CONCRETE: I, Bond Resistance; II, Shrinkage Stresses; III, Creep or Flow of Concrete Under Load—By W. H. Glanville, D.Sc., Ph.D., Assoc.M.Inst.C.E. [Technical Papers Nos. 10, 11, and 12, Building Research, British Department of Scientific and Industrial Research.] Paper; 6x10 in.; pp. 37, 49 and 39; line cuts and halftones. 9d. for No. 10 and 1s. each for Nos. 11 and 12, from His Majesty's Stationary Office, London, or British Library of Information, 5 East 45th St. New York City.

TIMBER DESIGN AND CONSTRUCTION—By Henry S. Jacoby, Professor of Bridge Engineering, Emeritus, Cornell University, and Roland P. Davis, Professor of Structural and Hydraulic Engineering, West Virginia University. Second Edition, partly rewritten. New York: John Wiley & Sons, Inc. London: Chapman & Hall, Ltd. Cloth; 6x9¼ in.; pp. 334; illustrated, mostly halftones. $4.50.

Letters to the Editor

Wearing a Society Pin

Sir—Referring to the letter of "Traveler" in your issue of Sept. 18, with regard to the wearing of the society pin by members of the American Society of Civil Engineers: The writer has also been somewhat of a traveler in his time and has found that the wearing of the pin has served as a means of introduction to fellow travelers wearing the same emblem, which has led to valuable contacts and acquaintanceships, the opportunity for which would have been missed if the pin had not been worn. To him it seems that the main object in wearing the pin lies in this direction.

To the writer it would seem that an employer of the type cited by "Traveler," who would discriminate against an applicant on account of his wearing a pin as an emblem of membership in such a society, is a man of an exceedingly narrow-gage type of mind. A ONE-TIME TRAVELER.

San Diego, Calif.,
Oct. 29, 1930.

Pressure Relief Valves on Pipes

Sir—Mr. Sommer suggests in the issue of Oct. 30, p. 702, that air valves properly applied would prevent siphon failures.

This is probably true in the ordinary case. However, when air valves are subject to freezing temperatures in isolated locations they are probably useless. I have been unable to find an air valve guaranteed to function without attention in a frozen condition. GEO. I. UITTI,

Chicago, Ill., Licensed Structural Engineer.
Nov. 4, 1930.

Underpass Center Piers

Sir—It was not my intention to comment upon the editorial on underpass center piers in the Oct. 16 issue. However, after reading the letter of G. J. Ray in the issue of Oct. 30 I am quite convinced that more can be said in relation to the entire matter than has been indicated. With the thought that some good may be derived from the discussion, this letter is written.

There can be no question that the experience and ability which is brought to the question by Mr. Ray establishes the statements he makes from his viewpoint without the necessity of argument. It is not my intention to question the statements made by Mr. Ray through the application of reason to mere assertion, but to cover some of the points he raises from a different viewpoint. Before I do this it is, of course, necessary to state that my entire contact has been from the viewpoint of a highway engineer. In my position as grade-crossing engineer for the Department of Public Works of the state of New York I have had personal contact with several hundred grade-crossing elimination projects. These projects have been upon all the railroads operating in New York state and the problems that have been considered varied from urban centers to and including the sparsely populated rural sections.

The flow of traffic upon any artery, not only as to its density but as to its hourly directional movement, is an essential element in determining the desirability or lack of desirability in the use of center columns. This consideration is just as important in a city street as upon an interurban highway; in fact, there are many city streets where the peak flow in the morning occurs 85 per cent in one direction, and upon this same street the peak flow occurs in the evening in the opposite direction. Taking 40 ft. or four traffic lanes (and there are many city streets with four and five lanes available for moving traffic) it becomes obvious that center columns create a congestion. Traffic, no matter whether any use is being made of the other two lanes, must pass through one side of the center columns. If we consider interurban arteries, the application of this practice to our commuting population admits of but one conclusion. Center columns slow down traffic and create a menace to the public.

Any student of highway traffic knows that more cars per day can pass a given point in one lane where all vehicles are traveling at 20 miles per hour than is possible where variable speeds are encountered up to 50 miles per hour. This, however, is no argument on interurban highways for the application of this principle as a penalty to the user of the highway. It is proper that three lanes of traffic may move in one direction while but one lane is moving in the opposite direction, so as to absorb the peak flows which are directional in character. Center columns thus preclude the full utilization of a highway designed for directional peak consideration.

It is not infrequently the case, where drainage conditions permit, to depress the highways and streets and thus reduce the cost of an elimination in obtaining clearance for a grade separation. This results in the introduction of adverse gradients with the attendant reduction in sight distance. In such instances, especially in sleety or slippery weather, center columns are a menace to the user of the highway.

It is, in general, true that steel structures providing for clear openings in subways are not as pleasing to the eye of the observer as solid concrete structures. This is so in many cases because the same thought is not extended to the use of a steel structure as to the adaptation of a concrete one. I say this after considerable observation in the use of various types. It is, however, not possible for me to escape the fact that "handsome is as handsome does." Wherever it can be accomplished, center columns should be removed from a highway.

In the longitudinal occupation of a street or a location of like nature affecting many streets there is without doubt considerable merit in the adaptation of the flat slab with center columns. However, this type should not be applied solely because it has been used in some other location or is economical and leaves the railroad clear of obstructions, so there will be no menace to the railroad employee. The concern I have is for the user of the highway on a stormy night when he encounters this fixed object of the center columns. This is a real menace.

As to the question of cost, which Mr. Ray stresses, much can be said in addition to the safety of the railroad employee for which the railroad is liable. However, I think that the whole situation can be easily summed up in the statement that our friend, John Public, pays for it all. In New York state he pays 50 per cent in the first instance, in addition to financing the railroad's share if the railroad desires to borrow from the state. It seems, from my viewpoint, that he should be given considerable consideration in the unobstructed use of his highway if it is feasible and reasonably economical to do so.

As to the expression of desirability by a community through its elected officers, this may or may not be desirable. I can easily look back over my period of more than twenty years' service with the state and recall at once the expression of a community for an improvement, which reflected the realtor's viewpoint and not the welfare of the user of the highway. There are many things which are the inalienable right of the community as a municipal body, but determining the character of a grade-crossing structure as it refers to its proper use by the public is most certainly not one of them. This is the duty of the mature, experienced engineer, who can and does study the problem from all viewpoints.

E. W. WENDELL,
Grade Crossing Engineer.

Albany, N. Y.,
Nov. 6, 1930.

How Science Serves Engineering

Sir—I have just read an editorial in *Engineering News-Record* of Oct. 2, p. 518, entitled "Is Science Serving Engineering?" In this editorial there appears a statement concerning the division of engineering of the National Research Council which I do not think is fair as it stands, and we ought, therefore, to be allowed an opportunity to reply.

As you know, this division is made up of representatives of the major national engineering societies of the country and certain members at large selected because of special fitness. The work of this division may be divided into two major groups: first, promotion, aimed at the encouragement of research generally; and second, the administration of projects of national scope and importance. Problems selected for study by the division are of broad fundamental character or of importance to a group of industries or public utilities, or to some branch of the engineering profession.

Although, as indicated above, all branches of the engineering profession are represented on this division, the particular problem referred to in your editorial has never been brought to the division's attention as needing solution. The limited staff of the division makes it necessary to restrict the number of problems undertaken at any one time. Years of experience in the handling of a large number of projects has led to the formulation of definite requirements before projects are undertaken. These requirements may be summarized as follows: (1) a real demand and need for the investigation; (2) the project to be a proper one for the division to sponsor; (3) the division to be the most appropriate agency to sponsor it; (4) suitable assurances to be given for financial support; (5) proper talent and facilities for successful accomplishment to be available; (6) the ultimate objective of the project to be public service.

Unformulated problems are frequently brought to the division, which are so complex that they require the combined knowledge of competent scientists and engineers for their solution. The definition of objectives and the formulation of a program of research are steps of primary importance. By its plan of organization as part of the National Research Council, the division is especially fitted to bring together scientists and technologists, able and willing to contribute the variety of knowledge and experience requisite for successful attack on any problem accepted for study.

The division, with the assistance of the various societies affiliated with it, acts in an advisory capacity in planning investigational programs for the project sponsored by it. These plans generally include a critical review of present knowledge in the field, the organization of a suitable committee and the bringing together of men and means for carrying out the plans. To assist in carrying out its plans the division can invariably count upon the sympathetic co-operation of societies, industries, governmental bureaus, universities and individuals.

Active research projects at the present time include highways, welding, heat transmission, electrical insulation and industrial lighting.

W. SPRAGUE,
Secretary, Division of Engineering and Industrial Research, National Research Council.

New York, N. Y.,
October 23, 1930.

Spacing Stirrups in Concrete Beams

Sir—The method of spacing stirrups in concrete beams without the aid of diagrams or tables, given by A. R. Jessup on p. 340 of the Aug. 28, 1930, issue of *Engineering News-Record*, may be simplified still further by the use of the ordinary slide rule. Two factors are required: (1) the length of beam, x, requiring web reinforcement; (2) the number of stirrups.

If the spacing, s, at the end is found as the author has done, then the number of stirrups, n, required at each end is $x \div 2s$. Or n may be found by other convenient methods. For the problem considered, $n = (8 \times 12) \div (2 \times 4.7) = 10+$, or, say, 11 stirrups.

To find the distance from the point where stirrups are no longer required to each stirrup, set twice the value of n—that is, 22—on the B scale of the slide rule over the length of x—that is, 96—on the D scale and read on the D scale under values of 21, 19, 17, 15 . . . 1 on the B scale, 93.7, 89.1, 84.3, 79.3 . . . 20.4. The spacing of the stirrups is 96 — 93.7 = 2.3 (from the end); 93.7 — 89.1 = 4.6 (from the first to the second); 89.1 — 84.3 = 4.8; 84.3 — 79.3 = 5.0. . . . These spacings can and should, of course, be "rounded off" for actual use.

It will be noted that only eleven stirrups are used in the above method, against fourteen in the original article.

R. R. MARTEL,
Professor of Structural Engineering, California Institute of Technology.

Pasadena, Calif.,
Sept. 30, 1930.

News of the Week

Sentiment in Canada For Saint Lawrence Seaway Is Growing

By Paul Wooton
Washington Correspondent

APPOINTMENT of the Canadian treaty commissioners on the St. Lawrence seaway is expected to follow shortly after the return of Premier Bennett from London in the latter part of the month. It is understood that O. D. Skelton, undersecretary for external affairs, has prepared in the prime minister's absence at the imperial conference all the papers incident to the forthcoming negotiations with the United States in order that Mr. Bennett may act without further delay.

Considerable pressure was brought to bear upon the premier to appoint the treaty commissioners before his departure for London last September, but he preferred to let the matter rest until his return to Ottawa because of the tariff and other legislation that the new ministry had to prepare in such short order for parliament. A reply to this effect was made to the U. S. state department's note of Sept. 2 in which resumption of joint consideration of the project was suggested.

Canada More Favorable

Reports from across the border indicate that in intervening weeks the sentiment in Canada for bringing the waterway plans to the point of execution has grown apace. There is a hint of apprehension that the change in the political complexion of the Congress of the United States may affect the administration's previously announced intention to press the project. It is not believed that this will persuade the President to postpone treaty negotiations, however, as the division of opinion in this country on the St. Lawrence project has been territorial rather than political.

Confirmation Not Required

Appointment of commissioners does not require confirmation by the Senate, and in the ordinary course of events the treaty itself will not be submitted to the Senate for ratification until December, 1931, when the new Congress will assemble for the first time in the absence of a special session next summer. The insurgent element in the Senate hails mostly from Northwestern states that are solidly in back of the St. Lawrence project, and opposition, if any, to ratification will arise from a probable demand for an understanding with respect to subsequent disposition of the power.

Some concern is felt in Washington regarding appointment of the treaty commissioners. The elections have placed several stout Republicans and Democrats on the list of lame ducks, and the President doubtless will be importuned to select the commissioners, probably three in number, from that group. It is believed, however, that Mr. Hoover will insist upon appointing men competent to deal with the complicated questions that will arise in drafting the treaty.

Two Fatalities on N. Y. Water Tunnel Raises Total to 23

Two workmen were killed Nov. 17 by a rock fall in the south heading of shaft 13 of the new 18-mile tunnel being driven for the New York board of water supply between Hill View reservoir above Yonkers to South Brooklyn, raising the total number of deaths on this work to date to 23. The accident occurred near the heading, 1,500 ft. from the shaft. Solid rock has been encountered throughout the entire heading and no timbering has been used. Without warning a heavy rock fall broke loose from the haunch of the arch, burying two men and severely injuring a third. Patrick McGovern, Inc., is contractor on the work.

Bank Failure to Delay Bridge Construction in Tennessee

Construction of three bridges, two minor structures in middle Tennessee and the proposed bridge over the Tennessee River near Dayton, Tenn., will be held up as a result of the financial difficulties of Caldwell & Co., investment bankers of Nashville, it is announced by R. H. Baker, state highway commissioner. Approximately $3,316,000 of state funds was on deposit in the Bank of Tennessee, a Caldwell subsidiary. With the exception of these three bridges, the highway commissioner said, the general road program of the state will not be interrupted.

Chicago Hydro-Electric Engineer Killed in Peruvian Riots

Labor riots in Mal Paso, a mining town in the Andes Mountains of Peru, resulted in the death of two Americans and the wounding of two others on Nov. 13. One of the Americans killed was John W. Chapman, of Chicago, a hydro-electric engineer who had been in the employ of the Cerro de Pasco Co. since the war. Peruvian troops were sent to the scene.

Wide World Photo

NEW YORK'S ELEVATED HIGHWAY PUT INTO SERVICE

The first section of the West Side elevated highway on Manhattan Island, New York, was opened on Nov. 13. It is built above the central section of West St. from Canal St. to 23d St. Ultimately it will be continued to connect with Riverside Drive at 72nd St. Provision is made in the highway for six lanes of traffic on the present deck. When traffic warrants it, a second deck may be added without strengthening the present columns or footings. The accompanying illustration shows the highway at the north end of the Canal St. ramp. Beyond may be seen the land being cleared for the new New York Central freight terminal. Its approach tracks also are to be elevated through this section of the city, but they will be over a private right-of-way inside the building line. The present tracks are located at grade on West St. at the far side of the portion of the new highway shown here.

Urge Development of Willamette River in Oregon

The Willamette Valley Waterway Association is the title of a new organization formed in Oregon to promote a movement for the federal canalization of the Willamette River, the state's largest stream. In the consideration of this development the organization will devote its study to three principal factors, namely, canalization construction, establishment of hydro-electric power plants and flood control. The Willamette River meanders through the center of the Willamette Valley from the town of Cottage Grove in the south to the city of Portland in the north, a distance of approximately 145 miles. To date there is but one hydro-electric plant on the stream, the Pacific Northwest Public Service Co. having a generating plant at the town of Oregon City, 30 miles south of Portland.

Control of the Huai River in China

The Chinese government has undertaken a project to control the floods of the Huai River, a stream with a drainage area of 50,000 square miles, which has repeatedly caused disastrous floods. Several centuries ago the bed of the river was filled with silt from the Yellow River, which left no outlet for the Huai water in flood time, when the water spreads over a large area of highly developed country with great loss of life and property. The first step is to provide an outlet for the floodwater, after which steps will be taken to improve navigation and reclaim areas now covered by shallow lakes. Several American-trained Chinese engineers are employed on the project.

Rapid Progress on Owyhee Irrigation Project

Contractors on the Owyhee irrigation project in Oregon are taking advantage of favorable fall weather to rush construction work on dam and tunnels. During October more than 33,000 cu.yd. of concrete was placed in the dam, and with a capacity of 1,000 yd. a shift, it is probable that rapid progress will continue during November. The General Construction Co. has the dam contract. Tunnel No. 1 has been excavated for 1,200 ft. at the inlet end and 1,100 ft. at the outlet; at the inlet end of tunnel No. 5, 3,000 ft. has been excavated, and at the outlet, 2,800 ft.

Britain to Build First Four-Tower Lifting-Span Bridge

A start was made during October on a new bridge to span the River Tees, England, at a point near Newport and so link up this part of North Yorkshire with South Durham in an almost direct line with Billingham, where great industrial developments are taking place and where a new town has sprung up. Negotiations have been going on for five years for the erection of the bridge, which is to cost about $3,000,000.

It is to be of a type new to the United Kingdom. There will be a central span, which is raised horizontally to allow large vessels to pass. The lifting equipment will be supported on four towers, two on each side of the channel. Electric motors will be used to work the span. The length of the central span will be 250 ft., and it will be possible to raise the span 160 ft. from its normal height of 28 ft. The height of the towers will be 200 ft. and the width of the bridge road 38 ft.

Road Work Done in 1930 Reviewed by Highway Officials

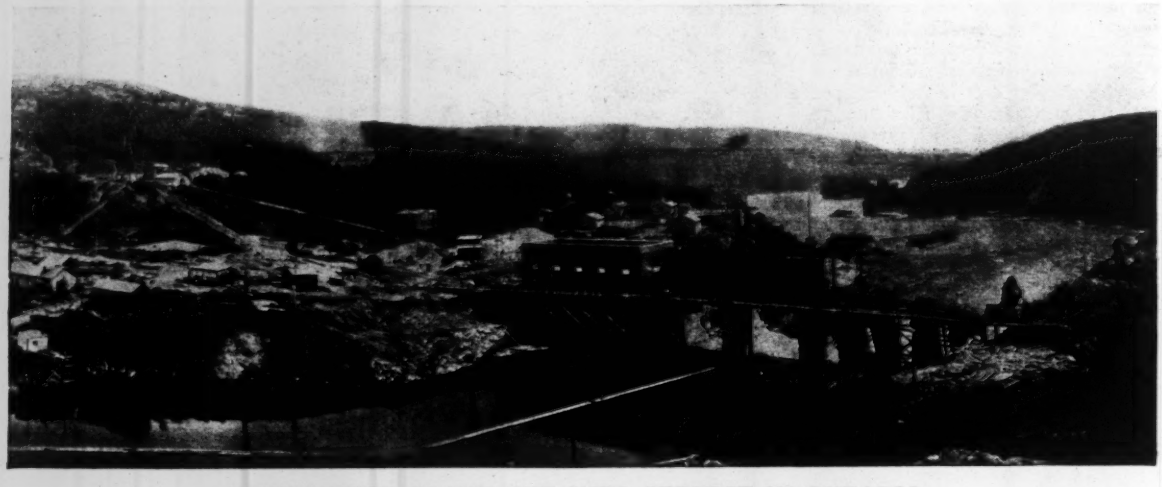
WITH 330 state highway officials in attendance from 46 states, the sixteenth annual convention of the Association of State Highway Officials opened its sessions at Pittsburgh, Pa., on Nov. 17 with a report by its executive secretary, W. C. Markham, which reviewed the road construction of 1930 and urged legislative consideration of motor-vehicle and gasoline taxation practices.

After stating that in view of economic situation his figures of progress, instead of covering as usual the work of the past calendar year (1929), had been compiled for the first ten months of 1930, Mr. Markham summarized new construction, the present status of road improvement, needed legislation and limitation of use of advance federal-aid funds.

Advance in Construction

Figures of state road construction for ten months of 1930 show these mileages: paved surface, 12,503; low-type surfacing, 15,763; and graded and drained, 9,951. Compared with all of 1929, this is an increase of 5,715 miles. Estimating that but one-half the expenditures went direct to labor, this means that not less than 50,000 additional men have been employed this year on state systems alone.

Of the 3,024,233 miles of roads of all kinds, 662,435 miles are surfaced with some kind of road material. Indiana leads with 69 per cent surfaced, and Ohio comes second with 52 per cent. The average of surfaced roads for the entire country is 23 per cent.



NEW POWER PLANT PUT INTO SERVICE IN ONTARIO

The Upper Notch hydro-electric power plant of the Canada Northern Power Co. was put into service on Nov. 12. It is located on the Montreal River in northern Ontario and was built to furnish additional power for the Kirkland Lake and Rouyn mining district. The plant is wholly automatic in operation, being designed for remote control. It contains two 6,500-hp. units developing 25-cycle power under a 48-ft. head. The plant was designed and built by the engineering and construction divisions of the Power Corporation of Canada, Ltd., of Montreal.

On Jan. 1 of this year the state systems were 62 per cent (gravel or better) surfaced.

Needed State Legislation

Since 42 state legislatures will convene within the next 60 days, attention was called to several items that should receive consideration by them. Some of these are:

1. The determining factors in levying motor license fees should not exceed two. Horsepower, gross weight or net weight are most commonly used, yet the receipts vary from $5.31 per car to $28.42. Primarily, motor fees are state funds for state roads.

2. The gas tax should at all times be used exclusively for road purposes. It is highly questionable whether a high gas tax should attempt to displace a reasonable motor license fee.

3. While there comes a time in the road building of a state when state aid to counties or cities is equitable, no state funds should be allotted to a political subdivision without state supervision of the expenditure. There are cases now where even townships are given funds to use without state supervision.

4. Rebates on gas tax need revision. There are 31 states which make some kind of rebate, and the percentage ranges all the way from 0.3 per cent to 32 per cent.

5. State highway departments should receive the funds collected from motor license fees and gas taxes at least monthly. Several states now receive them only quarterly and three semi-annually.

6. Toll-bridge legislation is greatly needed in several states.

Increased Federal Funds

The federal funds for 1931-32, which ordinarily are not allocated to the states until Jan. 1, were authorized for contracts in the early summer to aid labor in drought-stricken areas. But few states were able to make use of this allotment, as they would be compelled to pay all bills until July 1, 1931, when the federal funds would be available. Last August state highway officials called attention to the fact that the allocation of the 1932 federal funds would be of little assistance in aiding unemployment unless these funds were made available for payments as the work progressed. As stated then, Congress should make these funds available immediately subject to payments as earned.

Private Toll Bridges Condemned

Commenting on the increased road-building in his presidential address, Samuel Eckels, chief engineer, Pennsylvania highway department, stressed two facts: (1) Half of every dollar was for labor costs in field construction, and the greater portion of the remaining 50c. went to turn the wheels of industry in the production of materials and equipment, and half of this was paid to labor. (2) All this was possible because of the efficient organization of modern highway departments. President Eckels urged increased attention to roadside development and beautification.

At the conclusion of his address, he took a decided stand against privately owned toll bridges, advocated that present private toll bridges be acquired by the states and urged legislation prohibiting the future construction of such bridges.

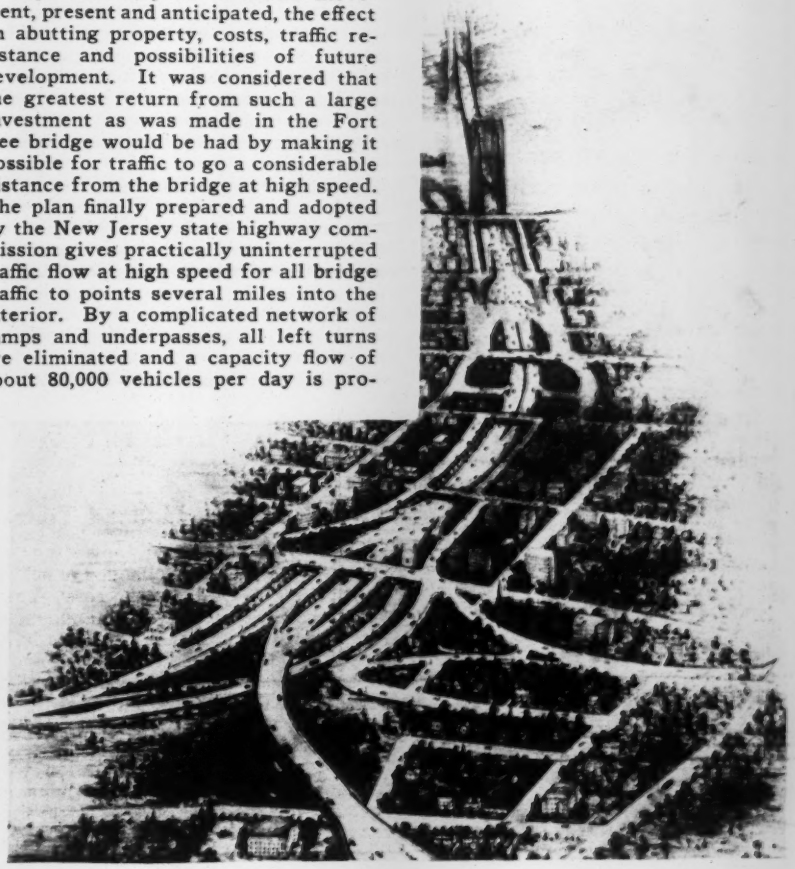
Complimentary Dinner Given to X. H. Goodnough

X. H. Goodnough, who recently retired from the position of director and chief engineer of the sanitary engineering division of the Massachusetts department of public health after 45 years' service, 30 years of which were as chief engineer, was tendered a complimentary dinner by his professional associates at the Engineers' Club, Boston, on Nov. 13. The dinner was attended by many engineers and members of the medical and legal professions and by government and state officials. Letters regretting their inability to attend were received from eminent sanitarians throughout the country. The toastmaster, Frank E. Winsor, chief engineer of the Boston Metropolitan District Water Supply Commission, characterized Mr. Goodnough as the "dean of public health engineers."

J. Waldo Smith, consulting engineer, New York City; Charles P. Howard, chairman of the Massachusetts commission on administration and finance; Warren J. Scott, director of sanitary engineering of the Connecticut department of public health; Davis B. Keniston, of the Boston Metropolitan District Commission; Harry W. Clark, director and chief chemist of the division of water and sewage laboratories of the Massachusetts department of public health, and James L. Tighe, engineering member of the Massachusetts Public Health Council, all expressed the united respect for Mr. Goodnough and his accomplishments of the past, a deep regret for his retirement from the public service, and the hope that he would enjoy many years of active consulting practice in order that the profession might not be deprived of his valued advice.

FORT LEE BRIDGE APPROACHES

The accompanying illustration shows a scheme developed to provide a free flow of traffic at the western end of the Hudson River bridge at Fort Lee, N. J. A difficult engineering problem was presented, requiring extensive survey and study as to traffic movement, present and anticipated, the effect on abutting property, costs, traffic resistance and possibilities of future development. It was considered that the greatest return from such a large investment as was made in the Fort Lee bridge would be had by making it possible for traffic to go a considerable distance from the bridge at high speed. The plan finally prepared and adopted by the New Jersey state highway commission gives practically uninterrupted traffic flow at high speed for all bridge traffic to points several miles into the interior. By a complicated network of ramps and underpasses, all left turns are eliminated and a capacity flow of about 80,000 vehicles per day is provided for. A feature of the design is a three-level highway structure in Fort Lee, which, it is claimed, is the only one of its kind in existence.



T. Coleman du Pont

An Appreciation by C. M. Upham, Secretary-Director, American Road Builders Association

T. Coleman du Pont, engineer, industrialist, financier, philanthropist, road builder, organizer, banker and former United States Senator, died at his home in Wilmington, Del., on Nov. 11, and thus was brought to a close the useful and colorful career of one of America's truly great men. Mr. du Pont was 66 years old and for many years had been prominent in the affairs of the nation.

Born in Louisville, Ky., on Dec. 11, 1863, the great-grandson of Eleuthere Irenee du Pont de Nemours, who founded the Du Pont powder industry in Delaware in 1802, Mr. du Pont was educated in Urbana University, Ohio, and Chauncy Hall School, Boston, and was later graduated in 1884 as an engineer from the Massachusetts Institute of Technology. After leaving college he began work as a miner in the employ of the Central Coal & Iron Co., Central City, Ky. He rose rapidly and became president of the company. At 30 he abandoned the mining business to become manager of the Johnson Steel Co., Johnstown, Pa.

In 1900 he became president of various coal and iron corporations in Kentucky. After a successful seven years during which he acquired a fortune, he retired from business and took up his residence in Wilmington, the home of the Du Pont family in this country.

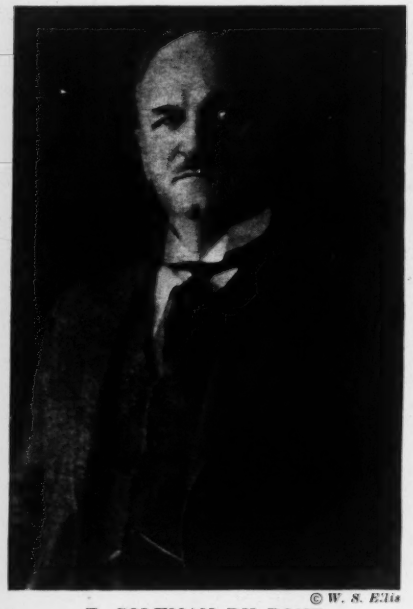
At the age of 39 he was prevailed upon to bring to a close his "retirement" and accept the presidency of the E. I. du Pont de Nemours Powder Co. Under his presidency from 1902 to 1915 the company was reorganized on a highly efficient and widely expanded basis.

It was during this period Mr. du Pont decided to become a road builder and put into effect some of his ideas, which at the time were novel but are now accepted as the best practice. His organization and design showed that he was a road builder and engineer of extraordinary vision. He was the first to put into practice the plan of carrying the highway location around the cities and towns, with connected spur roads into the community center. He advanced the theory of the right-of-way's producing sufficient revenue that the road could be maintained and paid for from the income. Mr. du Pont at his own expense built and presented to the State of Delaware a $5,000,000 boulevard known as the Coleman du Pont road extending the entire length of the state. His interest in roads did not stop there. He made donations to many organizations and associations that made it possible to carry on research and investigation and thus assist the art of road building. He was a generous giver to educational projects and institutions, one known donation having been $1,000,000 toward the expansion of Massachusetts Institute of Technology.

Mr. du Pont was a true organizer and builder. Financial successes, one after another, followed his efforts in the coal mines, steel industry, street railways, powder industry, insurance companies, hotels and real estate. He built and owned the $30,000,000 Equitable Building at 120 Broadway, New York City, at that time the largest office building in the world. Later he purchased the controlling interest in the Equitable Life Assurance Society, mutualized it and disposed of the stock to the policy holders, all without profit to himself. Later he organized a chain of hotels, building some and buying others. These included many well-known hostelries, such as the Waldorf-Astoria, McAlpin, Savoy Plaza and Martinique in New York, Willard in Washington, and the Bellevue-Stratford in Philadelphia.

Mr. du Pont retired from active business in 1928, but his love to create and carry on made his retirement one of name only, as he was still active in many of the affairs that had become so much a part of his busy life. Although he had not enjoyed good health for some time, his death came as a distinct shock to his many friends. His many achievements will stand as monuments to his memory.

CHARLES M. UPHAM.



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T. COLEMAN DU PONT

Traffic Through Holland Tunnel

On Nov. 12, the third anniversary of the opening of the Holland Tunnel in New York City between New York City and New Jersey, it was announced that more than 31,000,000 vehicles have passed through in the three years. From Nov. 1, 1929, to Oct. 31, 1930, 11,912,869 vehicles used the tube, an increase of 11.6 per cent over the traffic for the same period last year. Gross revenue for the second year of operation was $5,767,000, and preliminary figures of revenue for the third year indicate that the income will be more than $6,000,000. The tunnel cost $54,000,000.

Fifty-Year Planning Project Proposed in Philadelphia

The City Planning Commission o Philadelphia has submitted to Mayo Mackey plans which include the es tablishment of new traffic thorough fares in several parts of the city, con struction of new plazas and squares an extension of present ones. The plan, i carried out, may require 50 years fo completion. The scope of the plan in cludes approaches to the Delaware River bridge; further development o the parkway, Logan square and Rey burn plaza; development of the east and west banks of the Schuylkill River in conjunction with the Pennsylvania and Baltimore & Ohio railroads; improvements and highway and transit extensions in the West Philadelphia area around the new Municipal Convention Hall, Philadelphia General Hospital and University of Pennsylvania; the creation of an approach or court of honor at Independence Hall; establishment of a parkway belt in South Philadelphia separating industrial and residential areas, and provision for future construction of a tunnel beneath the Delaware River to New Jersey.

Problems of Semi-Arid West Are Discussed at Denver

Technical discussion on problems confronting engineers of the seventeen arid and semi-arid Western states took place in Denver, Colo., at the third annual meeting of the Association of Western State Engineers Nov. 13 to 15. Papers were presented on the various matters scheduled for discussion, after which resolutions stating the association's stand on the questions were adopted. Among the definite positions taken by the association were the following:

That the claims of federal ownership and right of control of the unappropriated waters of the Western states independent of state laws, as advocated from time to time by the federal department of justice, should be no longer advanced, and that in all cases pending and predicated on such claims of federal ownership, the water rights of the federal government acquired for federal projects should be determined in accordance with state laws.

That all unappropriated waters be subject to acquirement only under the laws of the states wherein such waters are located, subject, however, to interstate compacts and usual court procedure.

That the compilation of the irrigation district laws of the several Western states, prepared by the division of agricultural engineering of the U. S. department of agriculture, should be published at the earliest practicable date and be available for consideration by the legislatures of the various states at their forthcoming sessions.

That the U. S. Geological Survey should clear up arrearages in the publication of stream-gaging records by June

30, 1931, and that thereafter publication should be kept current and that for this purpose additional appropriations should be included by Congress in the deficiency appropriation bill.

The report of the committee on flood control and stream regulation was adopted. It recommended: (1) that Congress should adopt a national policy of flood control, as it has a highway policy, to prevent unending demands for federal funds, and to remove appropriations for flood control from the realm of "pork-barrel" legislation; (2) that the U. S. government should develop general plans for flood control and should aid in the construction of such works; (3) that any federal legislation should not take away from the several states the authority and responsibility for dealing with their own water, nor impose a system of federal control superior to state control over non-navigable streams.

The following officers were elected for 1931: president, Edward Hyatt, state engineer of California; vice-president, George M. Bacon, state engineer of Utah; secretary, R. J. Tipton, Denver, Colo. Sacramento, Calif., was designated as the place of meeting in 1931.

Brief News

IMMEDIATE STEPS leading to the purchase of all toll bridges, wholly or partly within the state, which are not at present definitely under negotiation, are planned by the state bridge commission of West Virginia.

WIDENING AND DEEPENING of the Cape Cod Canal to accommodate the largest vessels has been recommended to the war department by Col. Sherwood A. Cheney, district engineer, in a report which he has sent to Washington.

AN ORGANIZED EFFORT will be made, it is announced by State Senator Richards, to upset the constitutionality of the $100,000,000 bond issue adopted at the recent election in New Jersey on the ground that the bond department is unconstitutional.

AN IMPROVEMENT PROGRAM, involving the expenditure of $1,185,000, will be started soon on the Pittsburgh-Wheeling division of the Baltimore & Ohio R.R., it is announced. The work will include revision of the main line between Hayesboro and West Alexander, Pa., making it double track and laying new sidings.

RAILROAD CONSTRUCTION will be pushed in Canada to provide against unemployment. The Canadian National Railways has recently announced that it will lay 140 miles of track in the prairie provinces and will also make numerous improvements in the central section of the system, extending from northern Ontario to Levis, Que. The cost of this work is expected to match the $11,000,000 improvement program recently announced by the Canadian Pacific Railway.

WASHINGTON NOTES

BY PAUL WOOTON

Washington Correspondent

No Change in Flood-Control Act By This Congress Expected—Delay In Preparing the Boeuf Basin Case

NO CHANGE will be made in the flood-control act at the forthcoming short session of Congress, it is believed. Major-Gen. Lytle Brown, Chief of Engineers, has announced that it will be impossible to submit the reports covering the restudy of the flood-control plan until after the first of the year. This, combined with the delay in the litigation with regard to payment for land included in the proposed floodways, practically precludes Congress from acting at the December session.

Fifteen separate reports have been presented in the exhaustive restudy of the problem. General Brown is determined that these reports are to be thorough in every particular and has called upon the board of engineers for rivers and harbors to go over them. This has necessitated much field work which has not yet been completed. General Brown states that because of the importance of the questions involved he expects to review personally all the reports. This is expected to result in a delay of a month or more beyond the time at which the reports were promised.

Delay in Preparation of Boeuf Basin Case

It has been hoped to have the Kincaid case, the action brought by a land owner in the Boeuf basin, ready to lay before the court of appeals in October. The delay was due to the inability of the department of justice to complete its briefs. This means that at best the case will not reach the supreme court until the October term next year. If the court should agree to expedite the case, it would be possible to have a final decision early in the session which begins Dec. 7, 1931.

The Business Outlook

With business opinion obviously content to throw away the last two months of the year, there is nothing surprising in the continued decline of general business activity as the period of even normal seasonal stimulus passes. Our index of general business conditions is evidently still feeling for the bottom in waters never before tested, but probably deeper than any heretofore sounded in past depressions. Declining industrial activity is pulling it down more than general trade, and this fact lends some support to the hope that the lower it goes the sooner it will turn upward.

—The Business Week, Nov. 19.

There is every reason to believe that the government will carry to the supreme court the decision of Judge Borah, of the Eastern District of Louisiana, in which he holds that general public benefits may not be taken into consideration in reducing the amount of compensation to be paid. Judge Borah's decision was made in connection with the consideration of damages suffered by the railroads on account of the construction of the Bonnet Carré spillway. He ruled that benefits which accrue to the public generally are not proper offsets for damages. The government contends that the intent of the law is that the general benefits be taken into consideration.

Plans for the Spillway

At the Corps of Engineers, the thought is expressed that a reasonable way to handle the crossing of the spillway would be to build two trestles which could be used to carry all trains over the spillway during the time that it would be in operation. If the tracks of the other railroads are left as they are, they could be used without interruption except for a month of two every five or six years, it is pointed out. This would be much cheaper for the government than paying damages to the extent estimated by the railroads.

Thought also is being given to a plan whereby the highways would use the floor of the spillway, crossing the levee on ramps. In this way it is figured that large savings could be made, but it would mean the closing of those roads entirely during the period of spillway operation—a small percentage of the total time.

Power Needs of District to Be Surveyed

Earl H. Barber, of Reading, Mass., consulting engineer, has been appointed to make a survey of the power needs of the District of Columbia for which Congress appropriated $25,000 last July with a view to establishing a municipally owned and operated service. The language of the law appropriating the fund is rather broad but has been construed by the board of commissioners of the district to refer only to the power requirements of the district government as distinguished from commercial and household requirements. The study will be confined, therefore, to requirements for public buildings, street lighting and other publicly owned facilities.

New Plans Submitted for Dam in Washington

Delay in authorizing the project of the Western Washington Electric Co. in North River near Willipa, Wash., is due to the fact that the plan for the dam was not satisfactory to the Federal Power Commission, which was not willing to approve the arch type dam as proposed in the original application. New plans have been submitted covering a straight gravity type of dam which are under study. More than $3,000,000 will be expended on the project, at which 40,000 hp. will be installed.

Personal Notes

RALPH J. FOGG, who recently resigned from Lehigh University after eleven years as professor of civil engineering and head of the department of civil engineering and of the John Fritz Engineering Laboratory, has become associated with Condron & Post, of Chicago, consulting and designing engineers. The concern's practice in Chicago will be supplemented by the professional practice of Condron, Post & Fogg, Associates, in New York City.

HAROLD W. BUSH, who for the past year and one-half has been employed by Warren & Van Praag, Inc., as resident engineer on construction of the southeast sewer in Decatur, Ill., has been appointed by the Jones Engineering & Construction Co. as engineer on the Missouri River bridge project at Niobrara, Neb.

J. THEODORE WHITNEY, president of the Whidden-Beekman Engineering Co., consultants, of Boston, announces that beginning Nov. 17 its corporate name will be the Whitney Engineering Co.

H. K. GATLEY, with the engineering firm of Fuller & McClintock, New York, has been transferred to Memphis as resident engineer on the design and construction of a new water plant.

ALEX O. TAYLOR, formerly county engineer of Palm Beach County, Fla., and formerly associated with Malcolm Pirnie, consulting engineer, New York City, on the Jacksonville, Fla., investigation and the new St. Petersburg, Fla., water-works project, is now the New England representative and contracting engineer for the Luten Bridge Co., Inc., of Concord, N. H.

JOHN C. POTTS, formerly with Ulen & Co., New York, as resident engineer on bridge and railroad construction work in Persia, has accepted a position on construction work with the West Virginia state road commission. At present he is located in Moorefield, W. Va.

W. V. A. KEMP, former director of research of the committee on heat transmission of the National Research Council, and more recently research secretary of the National Electric Light Association, has resigned in order to travel abroad for a year to study engineering developments in other countries.

LORENZ G. STRAUB, of Kansas City, Mo., who has recently been employed on special studies of the Missouri River, has been appointed to the faculty of the University of Minnesota, where he will have charge of hydraulics. Previously Dr. Straub was in Europe two years making hydraulic studies, as the first Freeman Traveling Fellow of the American Society of Civil Engineers.

HENRY WOLCOTT BUCK has joined Buck & Sheldon, Inc., of Hartford, Conn., sanitary and general consulting engineers, and the name of the concern has been changed to Henry Robinson Buck, Inc. H. W. Buck, who is the son of H. R. Buck, was formerly with Dwight P. Robinson & Co., of New York City, and has also seen service in Spain and in Rio de Janeiro.

C. B. HOTCHKISS, in charge of the heating and ventilating work in the school of mechanical engineering at Purdue University for the last five years, has tendered his resignation, to become editor of *Heating and Ventilating*, published in New York. Professor Hotchkiss will be succeeded by Prof. W. T. MILLER, who has been connected with Purdue for several years.

J. Y. LEVEQUE and D. E. ROOT are directors and vice-presidents of the newly formed Pacific Coast Foundation Co., Inc., of San Francisco, a corporation formed to design and construct projects such as bridges, tunnels, foundations, subaqueous construction and hydraulic developments. FRANCIS BETTS SMITH has been retained as consulting engineer and SHERMAN W. GIBBS will also act in a consulting capacity for the company.

Obituary

THOMAS J. MILNER, the engineer who built the Georgetown loop on the Colorado & Southern Railroad, a horseshoe-shaped wooden trestle more than 100 ft. high at the highest point, died in Portland, Ore., Nov. 7, at the age of 81. Milner Pass, in the Estes Park country, was named for Mr. Milner, who went to Colorado in 1870.

FRANK C. MCCLORY, town engineer of Brampton, Ont., was burned to death on Nov. 9 when his car overturned and caught fire. Mr. McClory was born 28 years ago at Lindsay, Ont., and was a graduate of Queen's University, Kingston. He served for some time with the provincial department of highways in northern Ontario and in 1928 was appointed town engineer of Brampton.

GEORGE ARNOLD MCCARTHY, engineer in charge of the sewer system in Toronto, died on Nov. 13, at the age of 59 years. Mr. McCarthy was born in Moncton, N. B., and was graduated from McGill University in 1898. He entered the Toronto civic service as assistant engineer, and before taking control of the sewers had charge of many important works in the railway and bridge section, including the North Toronto sewer system and the disposal works near Leaside.

ARTHUR G. BIXLER, of Ashtabula, Ohio, who had been in the service of Ashtabula County for twenty years, died on Nov. 2. He was 52 years old. After being graduated from Ohio Northern University in 1906, he was with the maintenance-of-way department of the Pennsylvania Railroad until 1910, when he went to Ashtabula and had been identified with county engineering work since that time. He was elected county engineer in 1918 and served two terms. At his death he was a deputy in charge of bridge construction.

Society Calendar

AMERICAN ROAD BUILDERS ASSOCIATION, Washington; annual convention and road show, St. Louis, Mo., Jan. 10-16.

AMERICAN SOCIETY OF CIVIL ENGINEERS, New York City; annual meeting, New York, Jan. 21-23.

ASPHALT PAVING CONFERENCE, New York, City; ninth annual conference, Memphis, Tenn., Dec. 1-5.

ASSOCIATED GENERAL CONTRACTORS OF AMERICA, Washington; annual meeting, San Francisco, Jan. 26-28.

NATIONAL CRUSHED STONE ASSOCIATION, Washington; annual convention, St. Louis, Mo., Jan. 19-22.

NATIONAL PAVING BRICK ASSOCIATION, Washington; annual meeting, Pittsburgh, Pa., Feb. 4-6.

NATIONAL SAND AND GRAVEL ASSOCIATION, Washington; annual convention, St. Louis, Mo., Jan. 27-29.

INSTITUTION OF WATER ENGINEERS of England has sent an invitation to the American Water Works Association to send a delegation to the next annual summer meeting at Harrowgate June 16 to 19. Members of the American association are also invited to send manuscripts of two papers to be presented at the meeting, on "Modern Aspects of Water Purification" and "Modern Dam Construction." Manuscripts of the two papers should be received not later than the end of February, to allow time for printing and sending out advance copies.

MILWAUKEE ENGINEERING SOCIETY has elected officers as follows: president, T. Chalkley Hatton; vice-president, Max Rotter; secretary, H. W. Rohde.

MISSOURI VALLEY SECTION, American Water Works Association, held its sixteenth annual convention Nov. 5-7 in Cedar Rapids, Iowa. About 110 registered. Officers were elected as follows: chairman, H. V. Pedersen, Marshalltown, Iowa; vice-chairman, H. L. Brown, Salina, Kan.; secretary-treasurer, Prof. Earle E. Waterman, University of Iowa.

MID-SOUTH SECTION, American Society of Civil Engineers, held its annual fall meeting on Nov. 14 at Greenville, Miss., with 50 members in attendance. Papers were read by Lieut.-Col. F. B. Wilby, U. S. district engineer, Memphis, Tenn., on modern aspects of military engineering, and by Major T. B. Larkin, Corps of Engineers, Vicksburg, Miss., on the flood-control work being done by the army engineers in the lower Mississippi Valley.

NEW ENGLAND WATER WORKS ASSOCIATION met Nov. 12 in Boston. A description of the new gravity water supply for Albany, N. Y., was given by Robert E. Horton, supplemented by lantern slides and motion pictures on the construction work presented by Benjamin L. Smith, of Whitman, Requardt & Smith, consulting engineers, and J. M. Diven, of the Leadite Co. The Albany project includes the Alcove dam, completed in 1929, a 48-in. cast-iron supply main 105,000 ft. long, recently finished, and a filtration plant and distributing reservoir, now approaching completion.

NEW YORK SECTION, American Society of Civil Engineers, at its meeting on Nov. 19 discussed the subject of soil pressures and foundation studies. The principal paper was by George Paaswell, chief engineer, Corson Construction Co. Mr. Paaswell reviewed the interesting research and tests conducted in connection with the construction of the new Houston St. subway.

NEW YORK SECTION, American Welding Society, at a meeting on Nov. 18 listened to a well-planned program on the present status of structural welding throughout the United States from the standpoints of application and regulation.

SIXTH ANNUAL CONFERENCE ON WELDING of the engineering extension department of Purdue University will be held at Lafayette, Ind., on Dec. 10 and 11. The two-day conference will deal with the latest developments in application of welding as applied to manufacturing operations and maintenance problems. Manufacturers have been invited to exhibit and demonstrate welding equipment.

Construction Equipment and Materials

Concrete Pavement Yardage

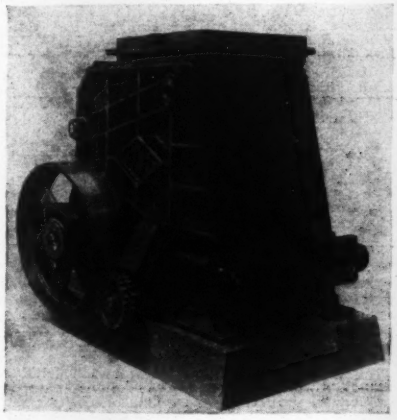
Appended below is a tabulation of concrete pavement yardage awarded during the month of October, 1930, and also the total number of square yards awarded for roads, streets and alleys in the United States for the year 1930 to date as of Nov. 1:

	Sq.Yd. Awarded During Oct., 1930	Sq.Yd. Awarded From Jan. 1, 1930 to Nov. 1, 1930
Roads	6,820,000	98,134,083
Streets	2,750,053	30,430,077
Alleys	175,361	2,154,976
Totals	9,745,414	130,719,136

New Developments

Yielding Jaw Used in Crusher

Jaw crushers, in sizes for all types of service, incorporating the yielding jaw principle and utilizing roller bearings throughout are now being manufactured by Guest Crushing Machines, Inc., 107 Annandale Boulevard, Los Angeles, Calif. Outstanding features include a breakable shear pin to prevent damage from foreign material lodged in the crusher jaws, provision for the instant release of such material without the necessity of explosives or dismantling, accessibility of working parts, size adjustment of the finished product while the machine is in operation and the use of Norma Hoffmann roller bearings with positive oil and dust seals. Manganese jaw plates are easily removed without dismantling the crusher. The eccentric jaw plate is reversible. Units comprising the flywheel pulley, shaft and bearings are balanced before assembly to minimize vibration. The machine can be used as both primary and secondary crusher, or as either. The manufacturer claims a 50 per cent increase in capacity in relation to weight over any other type of crushing machine, and a 25 per cent decrease in power consumption. It is stated that the 6x16-in. size, illustrated, will handle 9 tons of rock per hour with a maximum feed of 6-in. material, delivering a uniformly crushed product of ⅞-in. size.



6x16-IN. JAW CRUSHER

Control Apparatus for Ammonia

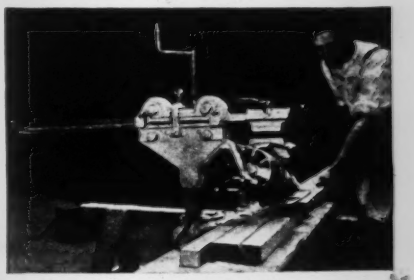
The increasing use of the chlorine ammonia process for the prevention of phenol and certain organic tastes and odors in water supplies has led the Wallace & Tiernan Co., Inc., Newark, N. J., to develop two types of ammoniators which follow very closely the design of their direct feed chlorinators, although certain modifications and changes have been necessary to adapt this apparatus to the feeding of ammonia gas. The type MDPA ammoniator is a self-contained unit and can be installed anywhere. The MDWA ammoniator is made in two forms, one for mounting on the wall at a place convenient to the point of application, the other for mounting on the standard Wallace & Tiernan type MDP or MSP chlorinators. The apparatus is guaranteed to an accuracy of 4 per cent.

PEDESTAL TYPE AMMONIATOR

Supporting Arm Adapts Portable Saw to Bench Use

A new accessory for electric hand saws has recently been developed by Skillsaw, Inc., Chicago, Ill., which quickly converts a portable saw into a table or bench saw. An extended movable arm to which the electric saw is clamped moves forward or backward on ball bearings, the saw sliding with the arm. This safety feature eliminates interference and provides plenty of working room with clear vision. Vertical adjustment for all depth cutting such as crosscutting, ripping, rabbetting and grooving, either straight or beveled, is obtained by a convenient hand screw, giving full depth capacity for the electric hand-saw which is used. On all operations, including mitering and beveling, the saw is locked against any movement, and cutting is performed by sliding the arm forward, away from the operator. For ripping, the saw can be locked in a fixed groove at right angles to the arm, which prevents blade binding. A spring safety clamp is also used for the protection of the operator.

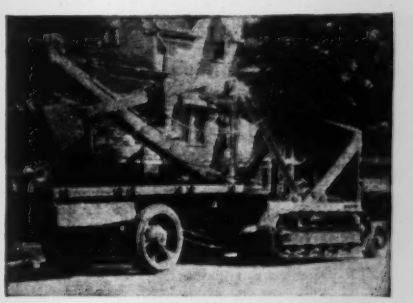
The radial arm is made of gray iron malleable castings. The pedestal is ground for accurate movement. It has a maximum vertical adjustment of 8 in. and a maximum cut-off width of 16 in., depending upon the thickness of the material to be cut. The beveling capacity is from 0 to 50 deg. Highest grade ball bearings are used throughout and long life is assured by take-up springs. The machine is securely bolted to a 2x12-in. plank 48 in. long. Net weight is 125 lb. Although designed for use with Skillsaw portable electric hand-saws, almost any type of electric hand-saw can be adapted to the radial arm by means of special brackets provided for the purpose.



PORTABLE SAW CLAMPED FOR RIPPING PLANK

Quickly Mounted Trailer Wheels Carry Light Shovel

Transportation of the model 40 ¾-yd. shovel-crane manufactured by the Byers Machine Co., Ravenna, Ohio, from one job to another is facilitated by a new-style rubber-tired trailer now being made by this company. This consists of two separate sets of heavy rubber-tired wheels, roller bearing mounted, on bar axles which are temporarily attached to structural brackets built on the main shovel frame when the unit is to be moved. Two large U-bolts hold the rear axle, while the front axle turns on a specially designed swivel joint and is held in place by a large kingbolt. Any

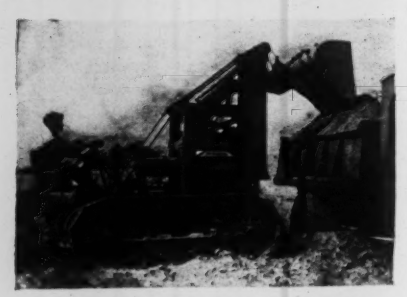


TRAILER UNIT ASSEMBLED FOR TRANSPORTATION

5-ton truck can haul the unit, connection being made by an 8-ft. tongue equipped with a heavy steel spring to absorb shocks. The trailer units, which weigh 3,700 lb., can be attached in the field in 30 minutes by two men, according to the manufacturer. This is done by running the excavator up on blocks and attaching the wheel units. As the crawlers are only 6 in. clear of the ground, the increase in head clearance is negligible. Use of the three point suspension principle makes it possible to make a 35-deg. turn.

Tractor Shovel Attachment Loads at High Level

High dumping clearance for loading large motor trucks is provided in a new model of the Trackson shovel attachment for the model 20 McCormick-Deering tractor produced by the Trackson Co., Milwaukee, Wis. This is a modification of the machine described in *Engineering News-Record*, Feb. 27, 1930, p. 383, which retains the advantage of the low-lift shovel for digging.

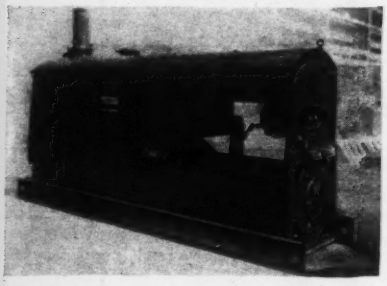


HIGH-LIFT TRACTOR SHOVEL LOADING TRUCK

The attachment does not interfere in any way with the use of the tractor for drawbar work, as the shovel can be locked in a partly raised position when not in use. Operation of the bucket is controlled by a single lever, with an automatic bucket release making it impossible to raise the latter too high. Drive for the bucket mechanism is on the front end of the tractor, and is independent of the motion of the machine itself, thus giving an entirely separate crowding action. The tractor can be equipped either with wheels or with standard Trackson crawlers.

Welder for Pipe Line Service

The demand for higher speed in welding gas and oil pipe line joints in the field has led to the development by the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., of a 600-amp., FlexArc, single-operator, gasoline engine-driven welder for use with high-speed, high-current, large-size, coated electrodes using high-voltage arcs. While the machine is designed primarily for use with such electrodes, the application of the FlexArc principle permits equally good operating characteristics and arc stability on the low-current ranges with small electrodes.



PIPE LINE WELDING SET

The machine is particularly adapted to rough and severe field service where sustained loads and high currents are required over long periods. It provides welding currents up to 750 amp.

The generator is the variable-voltage, constant-current type operating at 1,450 r.p.m. The new Westinghouse Flexactor is incorporated in the welding circuit, thus eliminating current surges at the time of striking the arc and while welding. The main generator frame fits directly into the engine flywheel housing, making it possible to use a single bearing flexibly coupled generator. An oversize exciter is overhung from the main generator bracket for separately exciting the welding generator shunt field and for furnishing auxiliary power. Separate excitation greatly increases the efficiency and simplifies welding current control. The generator control, consisting of a single dial rheostat, ammeter and voltmeter, are all mounted on rear panel of set with a protective cover.

Driving power is provided by a six-cylinder gasoline engine with an S.A.E. rating of 51.2 hp., developing 83 b.hp. at 1,450 r.p.m. Equipment includes a 25-gal. gas tank, Pierce governor, Eisemann magneto, large air cleaner, oil filter and protective radiator guard. The complete unit, mounted on 8-in. welded channels, is equipped with a sheet metal canopy with removaable sides.

Costs and Contracts

E. N.-R. Index Numbers

Cost			Volume		
Nov. 1,	1930	198.54	Oct.,	1930	211
Oct. 1,	1930	198.72	Sept.,	1930	232
Nov. 1,	1929	208.46	Oct.,	1929	273
Average,	1929	207.02	Average,	1929	317
Average,	1928	206.78	Average,	1928	287
1913	.....	100.00	1913	.....	100

This Week's Contracts

Heavy construction contracts, reported by *Engineering News-Record* in the week of Nov. 20, with some comparisons, total as follows:

(In Thousands of Dollars)

	Nov. 20, 1930	Average of Last Four Weeks 1930	1929
Buildings:			
Industrial	$3,386	$5,723	$21,050
Other	26,231	25,104	33,918
Streets and roads.	8,029	6,927	8,136
Other eng. constr..	12,853	14,124	12,821
Total	$50,499	$51,877	$75,927

Total, all classes Jan. 1 to Nov. 20:
1930 ..... $2,973,496
1929 3,758,230

Business Notes

CHAIN BELT CO., Milwaukee, Wis., has announced the following elections and appointments: C. F. Messinger, vice-president and general manager; Brinton Welser, vice-president and director; A. R. Abell, secretary; H. S. Greene, general sales manager; W. H. Brandt, assistant to the president.

HEADLEY EMULSIFIED PRODUCTS CO., Philadelphia, Pa., has opened a New York City office in the Chrysler Building in charge of P. L. Fosher, district manager.

CHICAGO PNEUMATIC TOOL CO., New York City, has opened a new service station for portable tools at 570 East Larned St., Detroit, Mich.

AUSTIN CO., Cleveland, Ohio, has opened a new Canadian branch to be located at Toronto, Ont. J. J. Lynch, formerly chief estimator of the Cleveland district, has been appointed manager.

G. G. GREULICH, for the past six years general manager of the Rivet Grip Steel Co., Cleveland, Ohio, has resigned to become a resident partner in the J. Willis Dalzell Co., Pittsburgh, Pa.

LINK-BELT CO., Philadelphia, Pa., announces the appointment of Frank W. Lovett as engineer in charge of sewage-disposal equipment in the Western territory, with headquarters in Chicago.

ALLIS-CHALMERS MFG. CO., Milwaukee, Wis., announces the appointment of the G. E. Hillsman Co., Chicago, as exclusive distributor for Monarch track and industrial-type tractors for certain sections of Illinois and Indiana. The G. E. Hillsman Co. has opened showrooms, offices and a tractor service department at 3900 South Wabash Ave., Chicago.

WICKWIRE SPENCER STEEL CO., New York City announces the following appointments: A. A. Wilmot, of the New York sales department, has been appointed assistant sales manager in charge of structural products at the Chicago office. G. L. Crawford, of the structural products sales staff at Chicago, is now assistant sales manager in charge of structural products at Tulsa, Okla.

AMERICAN CAST IRON PIPE CO., Birmingham, Ala., is completing a new shop at Acipco for the production of mono-cast centrifugal pipe in the larger sizes, from 14 to 24 in., inclusive. The pipe will be of the bell-and-spigot type, with a bead cast on the spigot end, and will be produced in 16-ft. lengths. The new shop will have a potential capacity of 200 tons of pipe per shift, and is so designed that it can be operated 24 hours per day.

New Publications

Rolling Doors—Rolling steel doors manufactured by the R. C. MAHON CO., Detroit, Mich., are described in a 36-p. illustrated catalog of the company.

Pipe Tools—Tapping machine cutters and pipe cutters of various types are described in an 8-p. bulletin of the WATER WORKS EQUIPMENT CO., 50 Church St., New York City.

Welding Rods—The advantages of green surfacing on electrodes for metallic arc welding are discussed in a bulletin of the FUSION WELDING CORP., Chicago, Ill.

Rubber Products—A new catalog of belting, packing, hose, matting and miscellaneous items manufactured by the DIAMOND RUBBER CO., INC., of Akron, Ohio, has just been issued.

Welding—"The Welder's Handbook," a 32-p. illustrated bulletin issued by the AMERICAN STEEL & WIRE CO., Chicago and New York City, is a useful manual of welding practice, using either gas or electric current.

Chain and Conveyors—Publications of the LINK-BELT CO., 910 S. Michigan Ave., Chicago, Ill., include a folder describing the Cub portable belt conveyor and a 32-p. comprehensive data book on Promal chains for power transmission and conveying services. Dimensions, strengths, list prices and weights are given in this data book.

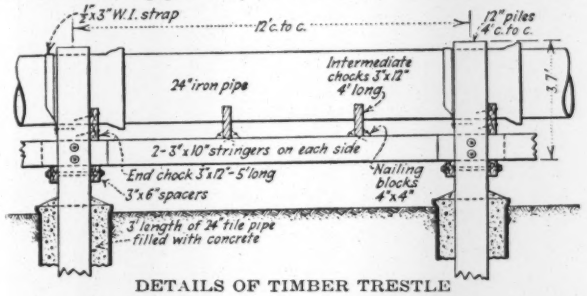
Power Excavators—Mechanical principles involved in the operation of the gas plus air 3-engined gasoline excavator are clearly set forth in a 16-p. illustrated bulletin of the BUCYRUS-ERIE CO., South Milwaukee, Wis. Other recent publications of this company include bulletins on the models 120-B and 100-B, 4 and 3 cu.yd. electric or steam revolving shovels and the models 1030 (¾-cu.yd.) and 1020 (½ cu.yd.) convertible shovels, draglines, drag shovels, and cranes.

Unit Prices From Current Construction Bids

C.-I. Sewer on Timber Trestle at Great Neck, N. Y.

SANITARY sewerage works are being constructed for the Belgrave Sewer District at Great Neck, N. Y., consisting of a screen chamber and 3,500 ft. of timber trestle carrying a 24-in. cast-iron trunk sewer connecting with an existing sewer. Site is the marshlands between the Long Island R.R. and Little Neck Bay. Ten bids were received Sept. 22, 1930, and contract was awarded to the Tuller Construction Co., Red Bank, N. J., for $101,515; average price $124,917.

Specifications require the use of either Atlas, Nazareth, or Edison cement. Concrete for manholes and screen chamber is 1 : 2 : 4, waterproofed with Celite, Toxement or Hydratite. Around each pile of the trestle is placed a length of vitrified tile pipe which is rammed with 1 : 3 : 5 concrete.



DETAILS OF TIMBER TRESTLE

The 3,500 ft. of cast-iron pipe is class B bell-and-spigot in 12-ft. lengths. It is laid by crane in the chock pieces of the trestle. Trestle bents are spaced 12 ft. center to center. Piles in each bent are connected with 3x6-in. spacer pieces placed correctly for grade and bolted as shown in the drawing. The 3x10-in. longitudinal stringers are then fitted into notches in the piles and bolted with 1-in. galvanized bolts Next a 3-in. chock piece 12 ft. long is set on the stringers and in notches in the piles. After completion, all exposed surfaces are given two coats of hot creosote oil, and all bolts, lagscrews and nails are given one coat.

A riprap embankment of traprock, limestone, dolomite, granite or other hand stone is placed around manholes and pile bents. The lines of the embankment are cleared and the base stones of ⅓ to ½ cu.yd. are laid and filled with spalls. The stones are generally 15 in. long and 6 in. high. Slope is 1½ on 1. An earth embankment 1½ on 1 is placed around some sections of the sewer. It is placed in 6-in. layers, rolled and tamped.

The screening and disinfection station will be erected on the property of the Long Island R.R. It is built of reinforced-concrete on timber piles, 10x18 ft. in plan by 15⅔ ft. to peak of frame roof, which is covered with copperclad asphalt base strip shingles 290 lb. per square. A concrete flow channel is built between end walls, connecting the inverts of the entry and discharge pipes, and two galvanized screen baskets are placed.

Unit prices are given of the lowest two bidders: A, Tuller; B, Gifford Construction Co., Jamaica, N. Y. Carl H. Watson, Great Neck, is consulting engineer.

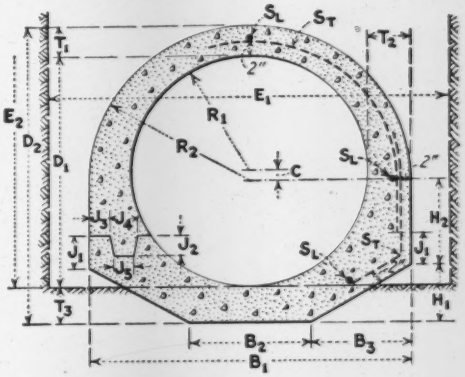
	A	B
3,250 ft. wood piling, 30-35 ft.	$ 1.00	$ 1.20
3,750 ft. wood piling, 35-40 ft.	1.00	1.20
8,500 ft. wood piling, 40-45 ft.	1.20	1.20
7,125 ft. wood piling, 45-50 ft.	1.20	1.20
2,750 ft. wood piling, 50-60 ft.	1.00	1.20
3,500 ft. timber trestle construction	3.50	4.50
25M ft. extra timber in place	60.00	50.00
500 lb. extra bolts, nuts, washers	.06	.10
1,700 ft. 24-in. tile pipe	1.80	2.00
100 cu.yd. concrete for pile protection	14.00	10.00
3,500 ft. 24-in. cast-iron pipe sewer	7.00	6.75
2,400 ft. 24-in. spiral riveted pipe	5.60	5.50
75 cu.yd. reinf. conc. in manholes	35.00	20.00
3,000 pcs. vitrified brick in manholes	.11	.10
12 sets manhole frames and covers	50.00	30.00
6,000 lb. extra steel reinf.	.04	.06
,.000 cu.yd. riprap embankment	6.00	4.00
3,000 cu.yd. earth embankment	1.00	1.00
100 cu.yd. broken stone foundations	3.00	4.00
200 ft. foundation drain pipe	.20	.20
1 screen chamber building	2,500.00	2,000.00
1,000 ft. ¾-in. copper water pipe	1.20	1.50
Totals	$101,515	$102.185
Working days	90	80

Monolithic Storm Sewer in Tulsa

PROJECT 9-C-30 of the new Cat Creek relief storm sewer in Tulsa, Okla., is a reinforced-concrete monolithic sewer 2,257 ft. long, on First St. from Boston to Frisco Ave. Included also are 1,374 ft. of 12- to 27-in. sewer tile. Bids were submitted on both precast and monolithic. Lowest bid for the job using precast was $30,796; monolithic, $29,030. For the 2,257 ft. of sewer alone the low bids were $10,972 for precast and $7,846 for monolithic. Standard Paving Co. submitted these bids and was awarded contract in June, 1930, on the monolithic pipe. The contract unit prices (A)

MONOLITHIC CONCRETE SEWER IN TULSA

	A	B
25 lin.ft. 12-in. sewer tile	$0.80	$0.80
584 lin.ft. 15-in. sewer tile	.95	1.10
388 lin.ft. 18-in. sewer tile	1.15	1.40
377 lin.ft. 27-in. sewer tile	2.50	2.65
376 lin.ft. 36-in. precast reinf. conc. sewer	3.85	4.20
1,468 lin.ft. 42-in. precast reinf. conc. sewer	4.80	5.00
413 lin.ft. 48-in. precast reinf. conc. sewer	6.00	6.50
5,800 cu.yd. earth excav.	1.05	1.00
100 cu.yd. loose rock excav.	3.00	1.00
100 cu.yd. solid rock excav.	5.00	3.00
12 standard manholes, 6 ft. deep	40.00	55.00
40 additional feet of manhole	5.00	5.00
2,644 sq. yd. pavement removed (2-in. asphalt top on brick)	.40	.40
2,644 sq.yd. class "G" paving replaced	2.90	3.50
Totals precast reinf. conc. sewer	$30,796	$32,945
Reinf. monolithic conc. sewer, excl. reinf. steel		
376 lin.ft. 36 in.	$3.15	$2.91
1,468 lin.ft. 42 in.	3.30	3.43
413 lin.ft. 48 in.	4.40	4.38
34,000 lb. reinf. steel in place	.04	.05
Totals monolithic conc. sewer	$29,030	$30,980
Number of working days	60	60



Dimensions in Inches

Concrete																	Steel	
D_1	D_2	B_1	B_2	B_3	R_1	R_2	C	T_1	T_2	T_3	H_1	H_2	J_1	J_2	J_3	J_4	J_5	S_T	S_L
36	46	48	18	15	18	24	2	4	6	6	8¾	13¼	5	3	3	4	3	½@10½	½@9
42	52	54	21	16½	21	27	2	4	6	6	9½	15½	5½	3	3	4	3	½@10½	½@9
48	59	62	24	19	24	31	2½	4½	7	6½	10⅞	17⅞	6	3	4	4	3	½@10½	½@9

Materials

Concrete			Steel Lb. per Lineal Ft.	
36	0.208 Cu.Yd. per Lineal Ft.		13.75	Including lap
			11.12	Excluding lap
42	0.245	" "	14.85	Including lap
			11.99	Excluding lap
48	0.313	" "	17.71	Including lap
			13.04	Excluding lap

Excavation Pay Line

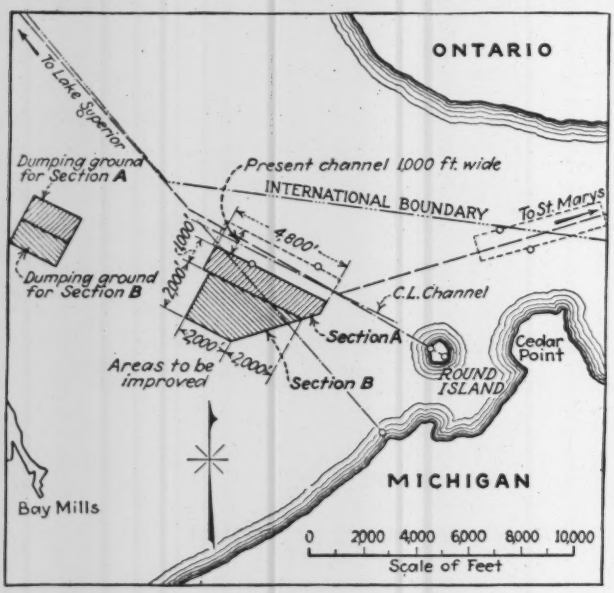
D_1	E_1	E_2
36	60	To F.L.
42	66	To F.L.
48	72	To F.L.

on the principal items are given and also those of the second lowest bidder, (B) Fike & Frye, Inc.

First St., along the center of which the sewer was constructed, is paved and carries heavy traffic. Time was an important factor, as this sewer projects the new union station area where tracks were being depressed. Specifications permitted use of ready-mixed concrete, and the successful contractor, who was also constructing two overhead crossings worth $300,000 adjacent to First St., owned and operated his own stone quarry and crusher, ready-mixed-concrete plant and asphalt plant (all paving in cut is asphalt). Price for excavation included bracing and sheeting. Concrete is 1 : 2 : 3.

Dredging in St. Marys River, Mich.

ROUND Island Middle Ground Shoal in the head of St. Marys River, Mich., is to be dredged to a minimum depth of 27 ft. below low-water datum. The work (see map) is divided into two sections, A to the north and B to the south, and is authorized by the rivers and harbors act approved July 3, 1930, which provides $4,920,000 of the $32,437,000 needed for the complete project. Material to be removed is believed to be clay, sand, gravel and boulders,

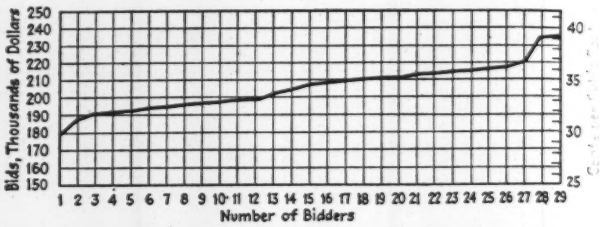


DREDGING IN ST. MARYS RIVER, MICH.

in unknown proportions, and removal by blasting will not be required. The contract was awarded in September, 1930, to the Great Lakes Dredge & Dock Co. at 27c. per cubic yard for the material above 27-ft. grade (843,000 cu.yd. on Sec. A and 776,500 cu.yd. on Sec. B), and half that price for overdepth between 27- and 29-ft. grades (211,600 cu.yd. Sec. A and 330,500 cu.yd. Sec. B). Average distance to dumping ground is 1½ miles, maximum 2½ miles. Major D. McCoach, Jr., is district engineer.

30c. Per Cu.Ft. for an Indiana Post Office

A REMARKABLE instance of close bidding on buildings is shown by the accompanying chart of 29 bids received Oct. 17 for a post office in Lafayette, Ind. Several years ago $375,000 was appropriated and later bids were called for but never opened, as a local contractor saw that his figure was going to be way below the estimate and he succeeded in having those in charge in Washington change the brick facing to stone and readvertise the job. The land cost $65,000, and for temporary quarters $15,000, leaving $255,000 for construction. The lowest bid was $179,215, or 30 per cent



TWENTY-NINE BIDS FOR A POST OFFICE

James I. Barnes, Logansport, Ind.	$179,21
Algernon Blair, Montgomery, Ala.	188,27
James Devault, Canton, Ohio	190,69
Dunlap & Co. Inc., Columbus, Ind.	191,31
A. E. Kemmer, Lafayette, Ind.	191,70
Fanning & Sweeney, Greensboro, N. C.	194,50
Murch Bros. Constr. Co., St. Louis	195,00
Henry B. Ryan Co., Chicago	197,00
Yeager & Sons, Danville, Ill.	197,63
Walter Petersen, Omaha	198,00
Strandberg Bros. Co., Chicago	199,50
Chas. Weltz' Sons, Des Moines	199,743
Ebenholtz & Co., Chicago	202,000
Edward S. Moore & Son, Kokomo, Ind.	204,900
Wm. MacDonald Constr. Co., St. Louis	208,700
Coath & Goss Inc., Chicago	209,450
W. W. Magee, St. Paul	210,000
W. R. Heath Constr. Co., Greencastle, Ind.	210,190
John Largura & Co., Gary, Ind.	210,500
Mads-Madsen Co., Minneapolis	211,427
E. Ainsworth & Son Constr. Co., Terre Haute	213,453
Ring Constr. Co., Minneapolis	213,500
Hanson Bros. Co., Chicago	215,787
John Grant & Sons, Cleveland	215,950
J. A. Moraw & Owens Co., Chicago	216,988
Phelps-Drake Co., Minneapolis	218,800
W. M. Allen Son & Co., Peoria	220,655
C. Kanzler & Son Co. Inc., Evansville	236,333
Chas. P. Johnson & Son, Inc., Chicago	237,250
Average	$212,000

under the money available and only 13 per cent below the average of the 29 bids. The building contains 598,000 cu.ft., and the low bid is 30c., said to be lowest since the war. Bidders 2, 3, 7 and 11 are specialists on post-office construction.

State Road Work in Florida

BIDS were received Oct. 6, 1930, by the Florida state highway department on two road grading jobs, and on two batches of materials. The two road jobs are: (*a*) 4.48 miles Tavares to Mount Dora, including considerable retaining-wall work; (*b*) 2.48 miles Eustis Road No. 2 to Tavres-Mount Dora. Listed below are the lowest three bids on each of the principal items and the lowest three total bids on the two jobs. Contracts have been awarded to (*a*) C. C. Moore Construction Co., Apalachicola, $81,029; (*b*) Manly Construction Co., Ocala, $4,664.

Road Work

	1	2	3
Regular excav., cu.yd.			
(*a*) 61,681	$0.30	$0.30	$0.32
(*b*) 10,380	.30	.33	.36
Class A concrete, cu.yd.			
(*a*) 3,053, for ret. wall	15.00	16.00	16.85
(*b*) 14, for headwalls	21.00	27.00	30.00
18-in. pipe, lin.ft.			
(*a*) 278 c.-i.	3.20	3.25	3.30
(*b*) 108 c.-i.	3.00	3.50	4.00
(*a*) 933 v.-c.	1.50	2.00	2.00
(*b*) 300 v.-c.	2.20	2.25	2.75
(*a*) 360 corr.-metal	1.40	2.00	2.10
(*b*) 300 corr.-metal	2.25	2.25	2.75
Total job			
(*a*)	$81,029	$83,086	$91,437
(*b*)	4,664	5,130	5,280

The materials on which bids were received (lowest listed below) were for work between (*c*) Trout Creek and airport; (*d*) Lake Butler and Columbia county line.

Materials for Road *c*

3,148 cu.yd. ready-mixed conc.	$9.69
800 tons cold binder course	8.30
800 tons hot binder course	11.17
2,949 tons rock asphalt	11.50
2,949 tons mac. asphalt	10.57

Materials for Road *d*

21,600 gal. tar prime T-C-1	$0.136
2,702 tons slag	3.30
54,000 gal. oil asphalt	.0537
2,702 tons crushed rock	3.05
2,792 tons gravel	3.25

CONSTRUCTION NEWS

Some of the Week's Large Projects

For further details turn to the appropriate sections in this issue

Location	Project	Cost	Status
Waterworks			
Phoenix (Ariz.)	Water supply line, etc.	$2,200,000	Bids asked
Bridges			
Chicago	Bridges	6,200,000	Proposed
Cleveland	Bridge	6,000,000	Proposed
Railway			
Washington	Railway	5,836,235	Proposed
Unclassified			
Oklahoma City	Gas distribution system	4,000,000	Proposed
Kansas City, Mo.	Grain elevator	1,500,000	Bids asked
Factories and Mills			
Long Island City	Factory	1,000,000	Proposed
Power Plant			
Dallas (Tex.)	Power plant	3,000,000	Proposed
Warehouses			
Worcester (Mass.)	Warehouse and freight terminal	1,000,000	Proposed
Buildings			
New York	Apartment	1,000,000	Separate contracts
New York	Apartment	5,000,000	Separate contracts
Newark (N. J.)	Apartment	1,000,000	Contracts
Chicago	Hospital	2,350,000	Proposed
Springfield (Mass.)	Hospital	1,000,000	Contracts
New York	Hospital	1,550,000	Proposed
Chicago	Office	3,000,000	Proposed
New York	Office	2,000,000	Proposed
Seattle	Office	1,000,000	Proposed
Toronto	Office	5,000,000	Contract
Baton Rouge	Capitol	5,000,000	Bids asked
Hackensack (N. J.)	Hall of Records	1,200,000	Bids asked
Paterson (N. J.)	Hall of Records	3,500,000	Proposed
New York	Municipal office	5,000,000	Bids asked
Toronto	Museum	1,500,000	Proposed
Galveston	School	2,000,000	Proposed
Chicago	Theatre	1,500,000	Contract
New York	Telephone exch.	1,000,000	Contract
New York	Freight terminal	9,000,000	Bids asked
Cincinnati	Publishing	1,800,000	Proposed

WATERWORKS

PROPOSED WORK

Md., Frederick—City, water supply dam, 500 ft. long, 50 ft. high, concrete, reinforcing steel, $200,000. E. St. C. Maxwell, City Hall, engr.

Mass., Bridgewater—Town, Bd. Selectmen, extending mains in South Vernon and Green Sts. $40,000 appropriated.

Mass., Franklin — Town, new watermains, $35,000.

Pa., Franklin — For 2 large water tanks, augment city water supply. $45,000. J. M. Snow, Franklin, engr.

Pa., South Pittsburgh—Westmoreland Water Co., subsidiary Community Water Service Co., M. W. Crownover, mgr., P. S. Wilson, supt. operations, 46 Cedar St., New York, soon takes bids brick filtration and storage building over sedimentation basin now under construction. D. C. Morrow, c/o owner, Washington, engr. Noted July 24.

Tenn., Lebanon—Work on plans and surveys filter plant, held up pending validation of bonds. $200,000. Weideman & Singleton, Chandler Bldg., Atlanta, Ga., engrs. Noted Aug. 21.

Tex., Point Isabel—City, c/o Secretary, waterworks, sewers. $135,000. H. E. Elrod, 316 Petroleum Bldg., Houston, consult. engr. Noted Nov. 6.

Tex., San Antonio—For 2 mi. probably 8 in. watermain, c.i. welded screw joints from Market St. Pumping Plant to new tower, $70,000. City Eng. Dpt., c/o W. D. Masterson, engrs. Work may be done by day labor, some of pipe will be purchased.

Ont., Caledonia—Council waterworks, $60,000. Ontario Eng. Co., Fort Erie, engrs. J. W. Avery, town clk. Interested in prices of everything.

Ont., Fort William—City, 1.5 mi. 8 and 10 in. mains from Darrell Ave. to Abitiki Power & Paper Co. plant. $17,000. C. B. Symes, city engr.

Ont., Kitchener—Rein.-con. storage reservoir, 3,000,000 Imp. gal. on Lancaster St. W. $20,000-$25,000. S. Shupe, City Hall, engr.

Ont., Stratford—For 2 mi. 6 in. c.i. mains, with valves, hydrants. $15,000. W. H. Riehl, City Hall, engr.

Ont., Westboro—R. E. Nelson, recvr., soon takes bids pumping station, Nepean Twp. $75,000.

Ont., Windsor—For 7,610 lin.ft. 6 in. c.i. mains in Ypres and Janet Aves., Elliot, Woodlawn and Forest Sts. $20,400. R. J. Desmarais, city engr.

Que., Lachine — Municipal Council raising $75,000, main on Bway. from 34th to 16th Aves. Noted Mar. 27.

BIDS ASKED

Ariz., Phoenix—Dec. 2, by City, 25 mi. 45- to 54-in. c.i., steel, welded rein.-con. or lock point supply line, 6.5 mi. 36- to 48-in. pressure line, reservoir, improving distribution system. $2,200,000. Holmquist & Maddock, Phoenix, local engrs. C. C. Kennedy, Call Bldg., San Francisco, Calif., consult. engr. Noted July 24.

Ind., Clinton—Nov. 24, by Mayor and Bd. Aldermen, mains, specials, elevated tank and tower, pumps, surface concrete reservoir, well, mass concrete found., mains, fittings, hydrants, pump house, appurtenances. $27,000. F. P. Joseph, Glenmora, engr.

Ind., Delphi—Nov. 25, by Common Council, T. R. Arnold, city clk., laying, furnishing 18,000 ft. 8 in. c.i. mains, fittings, valve boxes. $25,000. C. Brassman, 1009 Chamber of Commerce Bldg., Indianapolis, engr.

La., Clinton — Nov. 24, by Bd. Aldermen complete waterworks, incl. laying, supplying mains fittings, elevated tank on tower, pumps, surface concrete reservoir, wells, mass concrete foundation, pump house. F. P. Joseph, M. E., Glenmora, engr.

Mass., Shrewsbury—See "Contracts Awarded."

Mass., Westboro—Nov. 21, by Dpt. Mental Diseases, Commonwealth of Massachusetts, State House, Boston, 1 story, concrete pumping station at Westboro State Hospital. F. A. and F. M. Kendall, 45 Bromfield St., Boston, engrs.; also pumping machinery for same.

Mich., Dearborn—Nov. 26, by W. Querfield, clk. Dearborn Twp., 7,018 ft. 6 in. c.i. mains, valves, specials. $25,000. E. M. Orr, 307 Calvin Theatre Bldg., engr.

Mich., Detroit—Dec. 2, by Bd. Water Comrs., L. P. Fisher, pres., Filtered Water Reservoir No. 2, Springwell Station, West Warren Ave. G. H. Fenkell, genl. mgr. and ch. engr.; adv. E. N.-R. Nov. 20.

Mich., Eloise—Nov. 21, by H. H. Prenzlauer, secy., City Service Bldg., Detroit, 4,000 lin.ft. 6 in. fire main with hydrants, valves, gates, etc., for Wayne Co. Poor Bd., $20,000. Warner & Warner, 2231 Park Ave., Detroit, engrs.

N. Y., Brooklyn—Nov. 28, by J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, mains in Avenue T, Belmont, Fillmore, Lincoln, Park and South Portland Aves., Ross, Ryder, East 36th, East 37th, East 38th, North 4th and South 5th Sts.

N. Y., Creedmoor—Dec. 3, by Dpt. Mental Hygiene, State Office Bldg., Albany, water lines and sewers at Brooklyn State Hospital, Creedmoor Div. Noted Oct. 23.

N. Y., Long Island City—Nov. 28, by J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, mains in Woodhaven Blvd., Clover and 147th Pls., Grand Central and Utopia Parkways, 56th, 70th and Tudor Rds., 50th, 57th and 90th Sts., Cooper, Cypress, 55th, 67th, 72nd and 82nd, 29th and 47th Aves.

N. Y., New York—Nov. 28, by J. J. Dietz, comr., Water Supply, Gas & Electricity, Municipal Bldg., mains in Cannon and Robertson Pls., West 256th St., Arlington, Hobart, Nereid, Newman, Powell, Revere, Theriot, Waterbury, Zerega and Zulette Aves.

Okla., Holdenville—Dec. 2, by J. Kirk, city clk., impounding reservoir, earthen dam, spillway, pipe line, $150,000. C. H. Edge, Holdenville, engr. Noted Nov. 13.

Pa., Pittsburgh—Nov. 28, by E. G. Lang, dir. P. Wks., City County Bldg., foundations for new pumping station, building and machinery foundations will be carried on concrete piles, incl. 7,000 lin.ft. concrete piles, 8,500 cu.yd. excav., 385 lin.ft. 84 in. suction trunk, embedded in concrete, and 72 x 84 ft. sluice gate. $285,000. C. M. Reppert, City-County Bldg., engr.

Pa., Pittsburgh—Dec. 5, by B. P. Wks., City-County Bldg., E. G. Lang, dir., delivering and installing Brilliant Pumping Station control apparatus and connections for 6 synchronous motors and appurtenances, complete lighting installation. $90,000.

Wash., Aberdeen — City Council, bids about Dec. 8, rebuilding 4 mi. Wishkah domestic water system pipe line. $75,000. C. S. Watkins, water supt. Noted Feb. 20.

Ont., Durham—Nov. 21, by H. C. Rose, clk., 2 mi. mains, valves, hydrants, standpipe, $50,000. James, Proctor & Redfern, Excelsior Life Bldg., Toronto, engrs.

Ont., St. Thomas—See "Contracts Awarded."

Ont., Toronto — Nov. 25, by B. S. Wemp, mayor, City Hall, supplying, installing 8½ m.g.p.d. (Imperial) centrifugal pump, appurtenances. $20,000. R. C. Harris, City Hall, engr. Noted Oct. 9.

CONTRACTS AWARDED

Calif., Anaheim—E. B. Merritt, city clk., to American Cast Iron Pipe Co., Detwiler Bldg., Los Angeles, Class B c.i. pipe, 2,624 ft. 4 in. at $0.397 per ft., 4,576 ft. 6 in. $0.575, 160 ft. 8 in. $0.81, 5,000 lb. fittings at $0.0425 per lb. Noted Nov. 6.

Calif., Los Angeles—Gate valves, Spec. 2191, to Water Works Supply Co., 2326 East 8th St., $16,595.

Calif., Oceanside—Main extensions in Hunsaker St., to F. A. Rhodes, 2160 Hickory St., San Diego, $17,528.

Calif., Stratford—Bd. Directors Stratford Public Utilities Co., 30,000 gal. steel tank on tower, 1,200 ft. well, pump, motor, pipe lines, to E. W. Redman, Dudley St., Fresno, $20,787.

Ill., Chicago—Bd. Local Impvts., City Hall, water service pipes in South Sawyer, South Spaulding, Turner and South Homan Aves., to G. D. Hardin, 3139 Indiana Ave.; Eddy and Fletcher Sts., Cullen, Lambert, North McVicker and North Moody Aves., to P. J. Collins, 5521 Bway.; West 55th St., to Reliance Plumbing

See proposal advertising on page 98

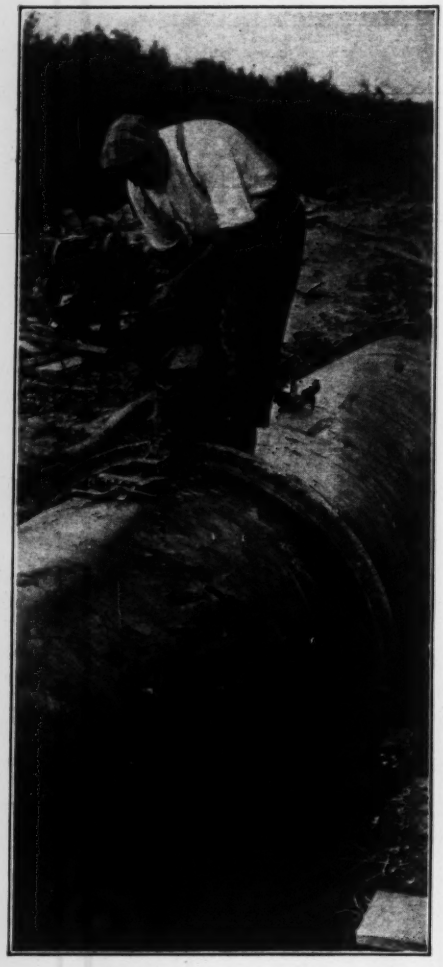
Constr. News page 207

LEADITE

LEADITE
saves in cost of material

LEADITE
does away with expense of caulking

LEADITE
reduces cost of digging bell holes



LEADITE
is light in weight and easy to handle

LEADITE
takes less time and heat to melt

LEADITE
puts the pipe line in service in quicker time

Pouring 48-in. c.i. pipe joints with LEADITE

The pioneer self-caulking material for c.i. pipe.
Tested and used for over 30 years.
Saves at least 75%

THE LEADITE COMPANY
Land Title Building **Philadelphia, Pa.**

No Caulking

Waterworks (Continued)

& Heating Co., 2430 West Van Buren St.; South Laramie, North La Vergne and North Meade Aves., to Walsh & Metzger, Inc., 6828 South Chicago Ave.; West 97th and South La Salle Sts., Harvard, Princeton, Yale, Wentworth, Ferry and LaFayette Aves., to Washington Plumbing & Heating Co., 461 North Halsted St. Noted Oct. 30.

Kan., Kansas City—Bd. P. Utilities, c/o C. A. Lowder, secy., City Hall, 18,000 ft. precast piles in place, to E. A. Whitney & Sons, City Bank Bldg., Kansas City, Mo., $25,740; grading site for new building, old waterworks site, to Rand & Son, 1030 Shawnee Rd., $5,873.

Kan. Tribune—Waterworks, to O'Neil Constr. Co., Leavenworth, $24,000. Est. $25,000. Noted Sept. 25.

Ky., Louisville — Louisville Water Co., Inc., 435 South 3rd St., two 500 hp. boilers, superheaters and ash hopper, to Henry Vogt Machine Co., 1000 West Ormsby St., $38,240; stokers, to Babcock & Wilcox, 85 Liberty St., New York, $16,839; feed water equipment, to Cochrane Corp., 17 bl. Allegheny Ave., Phila., Pa., $5,708; piping, to Crescent Plumbing & Heating Co., 821 East Jefferson St., $28,000; 36 m.g.p.d.c. filters, filter equipment and construction, to Pitt Constr. Co., Empire Bldg., Pittsburgh, Pa., $139,000. Grand total $228,478. Noted Oct. 16.

La., Marrero—Bd. Comrs. Jefferson Water Dist. 2, filter building for new waterworks, to J. M. DeFraites, 612 State St., New Orleans, $72,680; monocast pipe distribution system, to P. Olivier & Sons, Lake Charles, $105,029. Noted Oct. 1.

Mass., Boston—Dpt. P. Wks., furnishing gate valves with by-pass gates to Water Service, to Chapman Valve Mfg. Co., 71 A St., South Boston, $8,700.

Mass., Shrewsbury—Town, laying, relaying mains, Turnpike, day labor. $15,000-$20,000.

Mich., Detroit—Dpt. Water Supply, 1,000 tons 24 in. Class C pipe f.o.b. cars, Detroit, to Glamorgan Pipe & Fdry. Co., Lynchburg, at $37.90 per ton, total $37,900; 1,500 tons 36 in. Class C pipe, to U. S. Pipe & Fdry. Co., Burlington, N. J., at $38.40, total $57,600—1,000 tons 36 in. Class C pipe, to Lynchburg Fdry. Co., Lynchburg, Va., $38, total $38,000. Grand total $133,500.

N. J., Trenton—City Comn., motors and electrical equipment pumping station, to Mercer Electric Co., 338 South Broad St., $31,500.

N. Y., Menands (mail Albany)—Village, installing 2 mi. water system extension, to Sheehan Constr. Corp., 445 2nd St., Albany, $25,600.

N. Y., New York—Dpt. Water Supply, Gas & Electricity, Municipal Bldg., removing old Croton Aqueduct Arch and installing inverted syphon at Burnside Ave., to A. Gregorio & Co., 1121 Neil Ave., $81,305. Noted Nov. 3 Daily.

N. Y., New York—J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., mains and setting 6 in. valves, in Manhattan Boro, to Bronx Water Works, 1 Riverdale Ave., $7,300. Noted Oct. 30.

N. Y., New York—Dpt. Water Supply, Gas & Electricity, Municipal Bldg., steel watermains in Jerome and Sedgewick Aves., to Kniden Constr. Co., 4197 Park Ave., $119,142.

Ore., Portland — Mount Scott Water Dist., 76,600 lin.ft. 2 to 4-in. galvanized pipe 50,000 gal. covered concrete reservoir, 50 g.p.m. electric pumping plant, to D. P. Slater, The Dalles, $26,000.

Pa., Tarentum—Boro, water and electric light plant, building, to Pitt Constr. Co., Starr Bldg., Pittsburgh; piping, to Pittsburgh Piping & Equipment Co., 43rd and A. V. R.R., Pittsburgh; meters, to Builders Iron & Fdry. Co., 9 Codding St., Providence, R. I. Est. $150,000.

Tex., Amarillo—Phillips Petroleum Co., drilling 15 water wells along route new gasoline pipe line between Borger, Tex., and St. Louis, Mo., by way of Wichita and Kansas City, to D. L. McDonald, Amarillo. Est. $100,000.

Tex., San Antonio—City, drilling 15 in. artesian water well, to Lane-Texas Co., San Antonio, 10 in. well, to J. Rohmer, San Antonio, 10 in. well, to Dingman Drilling Co., Alamo Bank Bldg. Total est. $31,000.

Va., Orange — Water filtration plant, waterworks and sewerage systems, incl. 3.5 mi. water mains and 3.5 mi. sewers, to J. B. McCrary Co., Citizens & Savings Bank Bldg., Atlanta, Ga.

Ont., Almonte—Town, installing waterworks, to Grant Bros. Constr. Co. Ltd., 354 Bank St., Ottawa; stand pipe, to Horton Steel Wks. Ltd., Northern Ontario Bldg., Toronto, $6,600; hydrants, valves, to Drummond McCall & Co. Ltd., 373 Front St. E., Toronto, $5,500. 2 deep wells, to Layne Canadian Water Supply Co. Ltd., Metropolitan Bldg., Toronto, $18,900; c.i. pipe, to National Iron Corp., foot Cherry St., Toronto, $20,000. Noted Nov. 13.

Ont., St. Thomas—New coagulating basin at waterworks pumphouse, day labor under supervision A. Miller, city engr., to relieve unemployment. $28,000.

Ont., Thorold—Town, 90,000 imperial gal. per hr. centrifugal pump, to Turbine Equipment Co., 73 King St. W., Toronto. Est. $6,000.

Ont., Toronto—City, 12 in. hub end gate valves and 8 in. hub and flange gate valves, to J. T. Hepburn, Van Horne St., and T. McAvity & Sons, Yonge and Isabella Sts. Est. $19,602.

SEWERS

PROPOSED WORK

Ariz., Phoenix — City improving, extending sewers. $817,000. W. J. Jamieson, city engr.

Conn., Middletown—City, preparing specifications and soon takes bids sewerage system. $50,000-$75,000. G. A. Schaefer, City Hall, engr.

Kan., Wichita—City C. C. Ellis, clk., sewers, disposal plant. $700,000 voted for same. Black & Veatch, 700 Mutual Bldg., Kansas City, Mo., engrs.

Mass., Pittsfield — Sewage disposal trickling system. $500,000.

Mich., Sandusky—For sewage treatment plant, 500,000 g.p.d. $40,000. Pate, Hamann & Hirn, 922 Transportation Bldg., Detroit, engrs.

N. J., Asbury Park—Ocean Twp., chlorination plant, east end Elberon Ave. $60,000. G. R. Moore, engr.

N. J., Livingston — Township Comn., Town Hall, preliminary plans 24 mi. sewers, sewage treatment plant. $650,000. T. F. Bowe, 110 Williams St., New York, consult. engr. W. S. Logan, twp. engr. This corrects report in Nov. 6 issue.

N. J., Raritan—Bd. Educ., Township Hall, preliminary plans sewage disposal plant, appurtenances. $180,000.

N. J., Somerville—Boro Council, Boro Hall, preliminary plans sewage disposal plant, appurtenances. $300,000.

N. J., Union City—Bd. City Council, City Hall, municipal sewage disposal plant. $25,000 or more. Engineer not selected.

O., Canton—Stark Co., constructing sanitary sewer district in newly created area between here and Massillon, involving 3,225 acres. $250,000. G. Davidson, Court House, engr.

O., East Cleveland (br. Cleveland) — Soon takes bids sanitary sewers in Woodworth Rd., Dugway Creek, and Emily Ave.; paving Hillsboro Rd. $67,000 voted for same. M. Garnett, City Hall, engr.

Pa., Oil City—For 4,350 ft. 8- to 12-in. vitr. storm and sanitary sewers in Plummer and Maple Sts. and sanitary sewers in East 5th and West 7th Sts. B. B. Weber, City Hall, engr. **Maturity probably in spring.**

Tex., Galveston—City, soon takes bids sanitary sewers, incl. 8, 10 and 12 in. pipe, concrete drains. $250,000. W. P. McGarvey, c/o City Hall, engr. Noted Sept. 4.

Tex., Point Isabel—See "Waterworks."

N. S., Halifax—Additional sewers. $30,000. A. Gastonquay, mayor.

Ont., Hanover—Town, A. Armstrong, mayor, Town Hall, extending sewers. $40,000. C. R. Hagey, town engr.

Ont., Kitchener—For 1.5 mi. 8 in. and up vitr. tile storm and sanitary sewers in Schneider and Wendell Aves. $40,000, S. Shupe, city engr.

Ont., Orillia—Town, 2 mi. 8 in. and up storm sewer extensions. $30,000. R. Starr, Orillia, engr.

Ont., Sudbury—For 8 in. sanitary tile sewers in Ash, Douglas, John and Lourdes Sts. and 16 in. force main in O'Connor Park System. $40,000. W. McMullen, Mackie Blk., engr.

Ont., Welland—For 8 in. and up vitr. tile storm and sanitary sewers. $90,000. C. L. Coulson, city engr.

BIDS ASKED

Calif., Los Angeles—See "Streets and Roads."

Tex., San Marcos—City, c/o Secretary, election Dec. 9, $130,000, sewerage system.

Ill., Chicago—Nov. 25, by City, at office Bd. Local Impvts., City Hall, tile sewers, brick manholes, catch basins in Everell, North Nashville, North Natoma, North Nottingham and North Nagle Aves. M. J. Faherty, pres.

Ind., Indianapolis—Nov. 24, by Bd. P. Wks., sewer for U. S. War Veteran's Hospital, Lafayette and Cold Springs Rds. $50,684.

Md., Baltimore—Nov. 26, by Bd. Awards, sanitary sewers, storm drains in Storm Water Contr. 161. M. J. Ruark, Municipal Bldg., sewerage engr.

Md., Towson — Dec. 1, by Baltimore Co. Comn., Court House, 14,460 lin.ft. 8 in. 6,450 lin.ft. 15, 18 and 24 in. t.c. vitr. sewers, 3,733 ft. 6 in. t.c. house connections, 737 vertical ft. brick manholes, embraced in Contr. 22-S. B. L. Crozier, Court House, ch. engr.

Mich., Detroit—Dec. 3, by Dpt. P. Wks., City Hall, Detroit River Interceptor Sect. 7, in Woodbridge St. and West Jefferson Ave. from Brush to 6th Sts. P. A. Fellows, city engr.

Minn., Windom—Nov. 25, by M. Peterson, city clk., grading, sewers, paving 19,079 sq.yd. streets. $50,000. E. G. Briggs, 438 Bremer Arcade, St. Paul, engr. Noted Sept. 12.

New York—Dec. 5, by Pine Brook Drainage Comn., M. Stiner, secy., City Hall, New Rochelle, constructing Contr. 1, Sects. A, B and C, Pine Brook Drain, Mamaroneck and Larchmont; adv. E. N.-R. Nov. 20.

N. Y., Kings Park—Dec. 3, at office Dpt. Mental Hygiene, F. W. Parsons, comr., State Office Bldg., Albany, sewers, water lines at Kings Park State Hospital; adv. E. N.-R. Nov. 20.

N. Y., Long Island City—Nov. 24, by G. U. Harvey, pres. Queens Boro, Queens Subway Bldg., sanitary sewer in Farmers Blvd. and Jamaica Ave.; storm sewer in Rockaway Blvd.

N. Y., Wassaic — Dec. 3, by Dpt. Mental Hygiene, State Office Bldg., Albany, sewers, water lines at Wassaic State School, Dutchess Co.; adv. E. N.-R. Nov. 20.

O., Medina—Village, bids about Jan. 1 extending sewerage system, constructing sewage disposal plant. $135,000. George B. Gascoigne Co., Leader Bldg., Cleveland, engrs.

Tex., Fort Worth—City, c/o O. E. Carr, taking bids storm sewer front, point east of intersection of Boaz and Front Sts. to Jones and Front Sts. $40,000. D. L. Lewis, Fort Worth, engr.

CONTRACTS AWARDED

Calif., Carpinteria—Carpinteria Sanitary Dist., vitr. intercepting mains, to H. E. Adams, 502 East Haley St., Santa Barbara, $24,300. Noted Aug. 23.

Ill., Chicago—Bd. Local Impvts., City Hall, system concrete, brick, tile sewers, concrete bulkhead, diversion chambers, brick manholes, catch basins in Bernard St., Devon, Lincoln, Kimball, North St. Louis, Rosemont, Drake, North Central Park, Monticello, North Lawndale, North Ridgway, North Hamlin, North Avers, North Springfield, Crawford, North Keystone, North Korlov, North Kedvale, North Keeler, North Tripp, North Kildare, Lowell, North Kostner and Highland Aves., to Louis Scully, 4451 Nevada St. Noted Oct. 30.

Ill., Chicago—Bd. Local Impvts., City Hall, to Angelo Scully, 4504 Wrightwood Ave., 1,800 ft. drains in Beverly Ave. $2,322. 400 ft. Vanderboel Ave. $532, 1,200 ft. Kilpatrick Ave., 1,800 ft. Knox Ave. and 400 ft. 51st St. $4,784; to Petro Scalzitti, 2424 North Tripp Ave., 4,500 ft. Crawford Ave. $7,110. 760 ft. Foster Ave. $1,087; to Angelo Santucci, 10,000 ft. Crawford Ave. $15,900; to Nick Ranieri, 5036 Montana St., 5,000 ft. Crawford Ave. $7,900, 700 ft. Odell Ave. $1,188; to Marco Di Vito, 5217 South Kostner Ave., 600 ft. Barry Ave. $618, 200 ft. Cullom Ave. $200, 200 ft. Eddy Ave. $208, 400 ft. La Vergne Ave. 440, 200 ft. Merrimac Ave. $208. 500 ft. Merrimac Ave. $520, 600 ft. Mulligan Ave. $624. Grand total $43,640. Noted Oct. 30.

Mass., Boston—Dpt. P. Wks., J. A. Rourke, comr., sewerage works in Sumner Brook, Hunting Ave., Hyde Park Sect., to C. Russo, 499 Beech St., Roslindale. Est. $25,000. Noted Oct. 30.

Mass., Boston—Dpt. P. Wks., sewerage works in West St., Hyde Park, to De Christoforo Bros., 38 Glendower Rd., Roslindale, $20,482. Est. $25,000. Noted Nov. 6.

Mass., Boston—Metropolitan Dist. Comn., 1 Ashburton Pl., part of Sect. 109, New Neponset Valley Sewer, South Metropolitan System, in Milton, to V. Barletta Co., 8 Whipple Ave., Jamaica Plain, $179,585; part of Sect. 110, same system, to J. H. Ferguson, 289 Chapman St., Providence, R. I., $225,704. Noted Oct. 30.

N. J., Plainfield—Common Council, City Hall, storm sewer to increase capacity Cedar Brook, to A. Paino, Farmers Rd., Brooklyn, N. Y., $175,895. Est. $320,000. Noted Oct. 16.

N. Y., Brooklyn—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, sewers in East 7th St., to J. Peconi, 606 Rugby Rd., $3,224; East 46th St., to P. Ribis, $2,098; Foster Ave., to M. Fornaro, 261 1st Ave., $1,206; Logan St., to Matarazzo & Yondola, $5,497. Grand total $12,025. Noted Oct. 9.

N. Y., Brooklyn—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, to P. Vacaro, sewer in East 92nd St., $5,320; to E. Meluccio, 1209 61st St., Alabama Ave. $10,386, West 3rd St. $1,568, Danforth St. $1,037; to P. Ribis, East 46th St., $2,219. Grand total $20,530. Noted Oct. 30.

N. Y., New York—H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., sewers in Crotona Pl., to A. Spadaro, 724 East 225th St., $3,410; Eastchester Rd., to F. Gabriel, 2750 Creston Ave., $2,967. Noted Oct. 30.

N. Y., New York—J. Miller, pres. Manhattan Boro, Municipal Bldg., altering and improving sewers in Amsterdam Ave., to Murphy-Richmond Co., 50 Court St., Brooklyn, $77,574; 204th St., to T. A. Reilly, 105 Court St., $22,903. Noted Oct. 30.

O., Akron—Sewers, grading preparatory to erecting bridge over Cuyahoga River, to Shultz & Delluca Constr. Co., 140 North Summit St., $123,963. Est. $177,768.

Okla., Oklahoma City — Bd. P. Wks., City Hall, sanitary lateral sewer extensions in Frost Heights and Lawrence Place addition, to Koller Constr. Co., Tradesmen's Bldg. $27,005. Est. $30,000.

Ore., St. Helena—Concrete sewer, to C. R. Johnson, Portland, $43,612.

R. I., Providence — Bd. Contr. & Supply, screen and grit chambers, final settling tanks, primary tanks, Field's Point, to C. B. Maguire Co., Grosvenor Bldg., $104,523. Noted Oct. 23.

Tex., Port Arthur—For 4,000 lin.ft. 24 and 42 in. vitr. storm sewers, to T. L. James Constr. Co., Port Arthur, $47,000.

Tex., Gruver—City, c/o J. C. Richey, mayor, sanitary sewerage system, disposal plant, incl. 16,000 lin.ft. sanitary lines, to Asplund Constr. Co., Enid, Okla. Est. $38,000.

Va., Orange—See "Waterworks."

Ont., Toronto—City, vitr. tile storm sewers in 2 lanes, to J. Dileo, 239 Bellwoods Ave., $780; Dufferin St., to L. P. Acri, 28 Grove

Constr. News page 208

High-Early-Strength concrete approaches to garage and gasoline tanks of Epley Garage Co., Gettysburg, Pa. Universal Atlas methods and cement used. Peters Cement Products Co., Gettysburg, contractor.

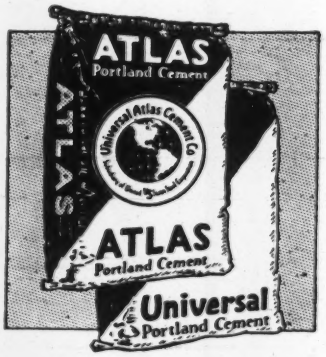
Traffic travels this concrete

TWO DAYS AFTER PLACING

● ● ● This garage and filling station is located at a stopover point for all overland busses using the Lincoln Highway in the East. New concrete drives to the pumps and into the garage were needed. For business reasons the owners did not want to tie up the station for a longer time than necessary.

By using high-early-strength concrete made with Universal Atlas methods and cement and by curing it with wet burlap, the contractors were able to open the pavement to traffic two days after placing. This two-day concrete reduced to a minimum the time the gasoline pumps were tied up.

High-early-strength concrete, made with Universal Atlas methods and cement, is used for concrete work which calls for speed, greater strength, watertightness and durability. A booklet containing the methods for obtaining it will be sent on request. . . . . .



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Universal Atlas Cement Co.

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Concrete for Permanence

CHICAGO
NEW YORK
NEWARK
PHILADELPHIA
BOSTON
ALBANY
PITTSBURGH
CLEVELAND
COLUMBUS

Sewers (Continued)

Ave., $9,985; concrete pipe. **Eastern Harbor Drainage System, Keating St., Sects. A and B, to W. E. Taylor, 22 Falcon St.** Noted Oct. 2.

Ont., Toronto—Sewers in Keating St. Sects. C-D, in connection with Eastern Harbor system, to W. E. Taylor, 22 Falcon St., $15,383; and **Keating St. Sects. D-E, to Ronco Bros., 224 Rosemount Ave., $11,308.** Est. $26,691.

BRIDGES

PROPOSED WORK

Ill., Chicago—City, c/o Bd. Local Impvts., City Hall, M. J. Faherty, pres., Ogden Avenue Impvt., incl. 2,961 ft. steel, rein.-con. viaduct over Goose Island, part 105 ft. and part 108 ft. wide, filled and paved approaches with roadway, sidewalks, and 2 single leaf bascule bridges, one 212 ft. long, 90 ft. wide with two 14 ft. sidewalks, other 244 ft. long, 84 ft. wide with two 12 ft. sidewalks, both over North Branch Chicago River. $5,460,000 bonds voted for same. W. A. Mulachy, 139 North Clark St., engr. Noted Oct. 9.

Ill., Chicago—City, at office Bd. P. Wks., City Hall, R. W. Wolfe, comr., double leaf bascule bridge, 210 ft. between masonry, 108 ft. wide, with two 36 ft. roadways, two 11 ft. sidewalks, steel viaduct 260 ft. long, 116 ft. wide with two 13 ft. 6 in. sidewalks, 88 ft. roadway, also 170 ft. filled approach and lateral connection to Wabash Avenue Bridge Viaduct on North State St., $3,500,000; double leaf bascule bridge 210 ft. between masonry, 90 ft. wide, with two 28 ft. roadways, and two ten ft. sidewalks carried on outside brackets on South Halsted St., $2,700,000. P. Schoiller, City Hall, engr. Noted Oct. 9.

Nebraska and Iowa—Free Bridge Com., C. D. Smiley, South Sioux City, Neb., preliminary plans high wagon bridge, rein.-con., steel across Missouri River, for Sioux City, Ia., and Dakota Co. (Dakota City), Neb. $800,000. A. Kirkham, Pierre, S. D., engr.

O., Cleveland — Bd. Comrs. Cuyahoga Co., rein.-con., steel bridge over Main Ave. $6,000,000 bonds voted for same. A. M. Folgate, Court House, engr.

Okla., Texhoma—Texas Co. preliminary plans 15 span 250 ft. pile trestle bridge replacing one washed away. $25,000. A. Calhoun, co. clk.

Pa., Pittsburgh—City, E. G. Lang, dir. City-County Bldg., reconstructing bridge approaches at Elizabeth St. $90,000. C. M. Reppert, City-County Bldg., engr.

Texas—See "Railways."

BIDS ASKED

Calif., Pulga—Dec. 3, by State Hy. Comn., Sacramento, bridge to have 349.95 ft. steel arch span, 82.14 ft., one 79.06 ft., two 62.51 ft. and one 44.02 ft. plate girder spans over tracks Western Pacific R.R. and across North Fork Feather River, Butte Co. C. H. Purcell, P. Wks. Bldg., ch. hy. engr.

Indiana and Illinois—Dec. 9, by Indiana State Hy. Comn., J. J. Brown, dir., and Dpt. P. Wks. & Buildings, Springfield, Ill., F. T. Sheets, ch. engr., at office Div. Hys., Springfield, Ill., Mt. Carmel Bridge, incl. twelve 225 ft. steel spans, 11 concrete piers, 2 concrete abutments, rein.-con. flooring, over Wabash River between Indiana and Illinois. Noted May 29.

Iowa—Nov. 25, by State Hy. Comn., Ames, 40 x 24 ft. I-beam bridge, 15 culverts, extensions, Rd. 16, B-681 Humboldt Co.—130 x 20 ft. high truss bridge with 40 x 20 ft. and four 50 x 20 ft. I-beam approach spans over Wapsipinicon River, Rd. 13, near Central City, B-443 Linn Co.—19 culverts, extensions, Rd. 2, B-675—16 culverts, extensions, Rd. 6, B-253, both Marion Co.—16 culverts, extensions, Rd. 15, F.A.B. 316—37 culverts, extensions, Rd. 16, F.A.B. 318, both Hamilton Co. C. R. Jones, aud.

Ia., Clarinda—Dec. 2, at office Auditor Page Co., 90 x 18 ft. skew pony truss bridge with concrete floor, abutments.

Mississippi—Nov. 25, by State Hy. Comn., Jackson, bridges, culverts on Laurel-Richton Rd., Jones Co., incl. 105 cu.yd. concrete, 10,160 lb. reinforcing steel in culverts, 51,865 f.b.m. creosoted lumber erected, 4,040 f.b.m. Z.M.A. handrail erected, 2,040 lin.ft. creosoted piling driven, also furnishing 85% No. 1 common pine (yellow) 85% heart oak f.o.b. site of Big Creek Bridge near Laurel, Mississippi Route 22, Jones Co. G. A. Draper, ch. hy. engr.

New York—Dec. 3, by Westchester Co. Park Comn., 72 West-Pondfield Rd., Bronxville, stone faced structural steel, rein.-con. protection for Catskill Aqueduct and 3 stone, timber faced rein.-con. bridges, on Saw Mill River Parkway, Mount Pleasant and New Castle. J. Downer, Bronxville, c. engr.; adv. E. N.-R. Nov. 20.

N. J., Caldwell—See "Streets and Roads."

Pa., Pittsburgh—Nov. 21, by E. G. Lang, dir. P. Wks., City-County Bldg., viaduct at Horace St. connecting new paved street with Blvd. of Allies (Liberty Bridge ramp). Contr. 2. $65,000. C. M. Reppert, City-County Bldg., engr.

Texas, Oklahoma, Kansas and Missouri — Missouri Valley Pipe Line Co., Kansas City, Mo., and c/o Matthews & Kenan, engrs., Smith-Young Tower, San Antonio, Tex., taking bids (selected contractors), 5 bridges in Texas, Oklahoma, Kansas and Missouri, all rein.-con., steel. $300,000. Noted Aug. 21.

Tex., Christoval—Dec. 8, by Comrs. Court Tom Green Co., c/o County Auditor, San Angelo, 500 ft. rein.-con. bridge over North Concho River. Noted Oct. 30.

Washington—Dec. 9, by S. J. Humes, dir. Hys., Olympia, 7 span, 336 ft. steel, rein.-con. bridge over Walla Walla River and Northern Pacific Ry., on S. R. 3, Walla Walla Co.

Ontario—See "Railways."

CONTRACTS AWARDED

California — State Hy. Comn., Sacramento, three 35 ft. and one 22 ft. span rein.-con. girder bridge on rein.-con. pile bents, 76 ft. roadway, two 12 ft. sidewalks, San Mateo Co., to Bodenhamer Constr. Co., San Diego, $35,756; rein.-con. girder bridge, Manhattan Beach, Los Angeles Co., to R. E. McKee, 515 Hewitt St., Los Angeles, $29,785. Noted Oct. 9.

Indiana—State Hy. Comn., Indianapolis, to H. V. Hay, Boonville, 3 rein.-con., steel bridges in Warrick Co. $13,469 est. $18,803; 3 in Martin Co. $12,016 est. $17,154—to C. D. Coil, 2525 Florida Dr., Ft. Wayne, rein.-con., steel bridge over New York Central R.R., Noble Co. $33,100 est. $50,814—to Clark & Duvall, Flora, rein.-con., steel arch span bridge, Switzerland Co. $30,000 est. $33,335 — to Dryder Bros., Wirt, rein.-con. arch span bridge over Eagle Hollow Creek, Jefferson Co. $27,125 est. $31,396 — to Elkhart Bridge & Iron Co., Elkhart rein.-con. girder bridge over Trail Creek, Laporte Co. $20,037 est. $29,080—to Kuert Constr. Co., 603 Occidental Bldg., Indianapolis, rein.-con., steel girder bridge over Chicago, South Shore & South Bend R.R., Laporte Co. $55,355 est. $88,545—to La Salle Constr. Co., Clay City, rein.-con., steel girder bridge, Tipton Co. $11,952 est. $15,062—to Reith-Riley Constr. Co., Goshen, rein.-con. girder bridge, Elkhart Co. $8,508 est. $11,186 — to Peppard & Fulton, Roanoke Bldg., Minneapolis, Minn., 2 rein.-con. girder and trestle bridges, Porter Co. $73,697 est. $102,966—to Ryan & Ryan, Washington, 1 rein.-con. girder and 2 rein.-con., steel arch bridges, Martin Co. $32,749 est. $42,017—to E. C. Wright, Bloomfield, rein.-con., steel span girder bridge, Martin Co. $45,172 est. $63,278—to A. E. Fulton, North Vernon, 2 rein.-con., steel arch span bridges, Jennings Co. $20,146 est. $30,291; 2 steel truss bridges, Jennings and Bartholemew Counties $25,276 est. $34,230—to Vincennes Bridge Co., Vincennes, steel truss bridge, Clay Co. $14,623 est. $18,729; rein.-con., steel overhead deck girder bridge over Baltimore & Ohio R.R., Martin Co. $15,975 est. $29,005; steel truss bridge, Pike Co. $28,449 est. $35,809; 3 steel truss bridges, Pulaski Co. $27,669 est. $36,283; steel truss bridge, Warrick Co. $6,970 est. $9,744. Grand total $502,288. Noted Nov. 6.

Maryland—State Roads Comn., Baltimore, G. C. Uhl, chn., extensions to single span rein.-con. arch bridge, Contr. M-160-311, Montgomery Co., to A. C. Conaway, Savage, $5,100. Noted Oct. 30.

Maryland—State Roads Comn., Baltimore, G. C. Uhl, chn., concrete bridge floor, approaches for Bridge Contr. H-104-42, Harford Co., and concrete bridge floor for bridge Contr. H-103-47, same county, to W. W. Truitt, Lincoln City, Del., $6,356 and $1,945 respectively. Noted Oct. 30.

Massachusetts—Dpt. P. Wks., Boston, steel plate girder and steel stringer bridge, rein.-con. beam bridge, approaches, in Palmer and Monson, to Lee Constr. Co., 133 Southampton St., Boston. $158,672; rein.-con. beam bridge, bituminous macadam approaches in Wareham, to A. K. Finney, Plymouth, $42,614. Noted Nov. 6.

Missouri—State Hy. Bd., Jefferson City, to Forcum James Co., Dyersburg, Tenn., bridges over Drainage Ditch 6, Sta. 667-46.2, on Hayti-Caruthersville Rd., $10,855; on Sta. 721-75, $10,662, Pemiscot Co.—to List & Weatherly Constr. Co., 416 Railway Exch. Bldg., Kansas City, over Bee Creek, on Weston-Route 92 Rd., $15,045; on same road over Chicago, Great Western Ry., $11,557, both Platte Co.—to W. K. Ferman, LaPlata, over branch, on Purdin Rd. E., Sta. 316-65, $1,801; over Sta. 357-45 $2,778, both Linn Co.; on Route-Fillmore Rd., Andrew Co. $4,046—to Nevada Constr. Co., Nevada, on Butler Rd. W, Route SA, Sect. 3, $762; Sect. 4, $747, Bates Co.—to M. Wunderlich, 734 Snelling Ave., St. Paul, Minn., on Cassville Rd. E., Route 44, Sect. 329A, Sta. 11-70, $9,165; same road Sta. 6-01, $10,656; same road Sect. 329B, $5,696; Sect. 329D, $32,256, all foregoing Barry Co.; Dade Co.—Route 66 Rd., Route 39AP., Sect. 17, $3,855; Sect. 18, $1,299; Sect. 19, $11,031, all foregoing Lawrence Co.; over South Fork Salt River, on Mark Twain Park, $52,212; over South Fork Salt River, $34,001, both Monroe Co.; over Spring Branch, Versailles Rd. S., $10,125; over Clear Dale Spring, $997, both Morgan Co.; over St. Louis & San Francisco R.R. on Thru Thayer Rd., $12,340; over branch, $3,325, both Oregon Co.; on Perry Rd. S., Ralls Co. $9,023; over branch, Sta. 95-85, on Forsythe-Bradleyville Rd., $4,310, and same road Sta. 71-18, $9,176, both Taney Co.—to Kelly & Underwood, Granby, over Fidelity Branch, Sta. 256-65, on Carthage-Neosho Rd., $4,615, on same road Sta. 277-68, $4,121, both Jasper Co.; on Carthage-Neosho Rd., Sta. 272-00, $4,836; on same road Sta. 311-27, $2,908; on Carthage-Neosho Rd., Dry Branch, $5,666; over Shoal Creek, $32,387; over St. Louis & San Francisco R.R., $12,369, all foregoing Newton Co.—to G. W. Condon, 233 Grain Exch. Bldg., Omaha, Neb., near Eureka, St. Louis Co., $11,692; on Glasgow Rd. N., Howard Co., $17,319—to Knox & Penzel, Jackson, on Cape Girardeau R. W., Cape Girardeau Co., $8,016—to Pittsburgh-Des Moines Steel Co., Tuttle and Southwest 10th St., Des Moines, Ia., on Dearborn-Edgerton Rd., Platte Co., $20,228—to O. O. Fuller, Nevada, on Pineville Rd. E., McDonald Co., $33,315. Grand total $425,192. Rejected bids Oct. 31, bridge on Newburg Rd. S., Phelps Co. Noted Oct. 23.

Mo., Kansas City—Kansas City Terminal Ry. Co., superstructure 1,200 ft. viaduct over Oak St., to McClintic-Marshall Co., 38 South Dearborn St., Chicago, Ill., $95,000. Noted July 24.

N. Y., Cortland—Westchester Park Comn., 72 West Pondfield Rd., Bronxville, stone faced overcrossing at Main St., Bronx Parkway extension, to J. Aboria, West Cedar St., Poughkeepsie, $52,176. Noted Oct. 9.

N. Y., Greenburgh (mail Scarsdale)—Westchester Co. Park Comn., 72 West Pondfield Rd., Bronxville, superstructure and portions substructure rein.-con., structural steel bridge, south end Woodlands Lake, to Doyle & Daly, Arlington Ave. and 232nd St., New York, $20,345. Noted Oct. 9.

N. Y., Mount Pleasant—Westchester Co. Park Comn., 72 West Pondfield Rd., Bronxville, 3 stone faced rein.-con., structural steel bridges south of here, to R. W. Briggs, Saw Mill River Parkway, Yonkers, $157,047. Noted Nov. 5.

Okla., Coyle—State Hy. Dpt., Oklahoma City, 5 span steel truss bridge on concrete piers, Logan Co., to Schlicter Bridge Co., Clay Center, Kan., $89,905. Est. $100,000. Noted Sept. 4.

Texas—Missouri Valley Pipe Line Co., Kansas City, Mo., and c/o Matthews & Kenan, engrs., Smith-Young Tower, San Antonio, Tex., 210 ft. rein.-con., steel bridge, 30 ft., over Canadian River, 23 mi. north of Borger, to F. Parrott, 1st Natl. Bank Bldg., Dallas and Wichita Falls, $86,000. Noted Aug. 21.

Tex., Houston — City, c/o W. E. Monteith, mayor, rein.-con. bridge over Brays Bayou on Almeda Rd., to D. Hall, Union Natl. Bank Bldg., $35,125. Est. $45,000. Noted Oct. 16.

Virginia — State Hy. Dpt., Richmond, to Blount & Hayman, Brodnax, four 30 ft. span rein.-con. I-beam bridge and 60 ft. steel truss span bridge over Slate River, Buckingham Co., $14,202; three 30 ft. span I-beam bridge over Blackwater Creek, Nelson Co., $8,066; 40 ft. rein.-con. I-beam bridge over Jennys Creek, Nelson Co., $4,986—to Fredericksburg Bridge Co., Fredericksburg, two 30 ft. span rein.-con. I-beam and 75 ft. low steel truss span bridge over Tye River, Nelson Co., $11,408—to Alley Constr. Co., Bristol, bridge over Powell River, Lee Co., $3,225. Grand total $41,887. Noted Oct. 30.

Wisconsin—State and Sauk Co., Hy. Comns., Capitol Annex, Madison, constructing Butterfield Bridge, to A. O. Clark, Wausau, $22,674; Louisville Bridge, to E. Kraemer, Plain, $15,896. Noted Oct. 30.

B. C., Hazelton—P. Philip, engr. Dpt. P. Wks., Victoria, Hagnelgate Suspension Bridge, 460 ft. steel, 16 ft. over Bulkley River, to Baynes & Horie, 846 Howe St., Vancouver, $27,998. Noted Oct. 23.

STREETS AND ROADS

BIDS ASKED

Alabama — Dec. 17, by State Hy. Comn., Montgomery, grading, draining 35 mi. Mississippi Valley Hy. between Mobile and Citronelle, Mobile Co., 18 ft. $425,000. Cost to be borne by Mobile Co. and Federal Government but under supervision State Hy. Comn.

Arizona—Nov. 24, at office State Hy. Comn., Phoenix, oiling 5 mi. Washington Blvd., A.F.E. 8011, in Phoenix. W. W. Lane, state hy. engr.

Calif., Bell—Dec. 1, by City Council, grading, oil macadam paving A and I Dist. 7. $30,000. T. R. Bousman, city engr.

Calif., Belmont—Taking bids grading, 700,000 sq.ft. oil and rock on rock macadam surfacing storm sewers, 180,000 sq.ft. 2½ in. asphalt on rock macadam paving.

Calif., Los Angeles—See "Contracts Awarded."

Calif., Los Angeles — Nov. 26, by Bd. P. Wks., City Hall, grading, storm drains, sanitary sewers, 8 in. concrete paving 783,000 sq.ft. Mulholland Hy. from Cahuenga Blvd. to Laurel Canyon Rd.

Calif., Oakland—F. Merritt, city clk., taking bids grading, storm water inlets, manholes, vitr. conduit, concrete paving 475,000 sq.ft. Foothill Blvd. from Park St., to Hollywood Blvd.

Calif., San Francisco—Dec. 3, by S. J. Hester, secy. Bd. P. Wks., City Hall, grading, curbing, guttering, 2 in. asphaltic concrete on 6 in. waterbound macadam surfacing streets in Golden Gates Heights. To exceed $45,000.

Calif., South Gate (br. Huntington Park)—City Council probably takes new bids at once, grading, curbing, concrete paving 113,000 sq.ft. Tweedy Blvd. between Alameda St. and Atlantic Blvd. To exceed $125,000. Noted Oct. 30.

Delaware—Dec. 16, by State Hy. Dpt., Dover, grading, clearing, concrete paving 4.911 mi., St. Georges-Drawyers (Dual Hy.), Contr. 169—grading 0.3 mi. Fill (Marshallton Cutoff, Contr. 144A—800 lin.ft. wire cable guard rail, 6 dead men for guard rail, Penny Hill, Contr. 81A; adv. E. N.-R. Nov. 20.

Illinois—Nov. 25, by State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, concrete surfacing 2.63 mi. Route 57, Sect. 571W-1, 40 ft., Cook Co. F. T. Sheets, ch. hy. engr.

Constr. News page 209

Streets and Roads (Continued)

Illinois—Nov. 26, by Dpt. P. Wks. & Buildings, Div. Hys., Springfield, construction of protection for fender piers and pile clusters for bridge across Illinois River, Route 36, Sect. 20-E, at Florence, Pike Co. F. T. Sheets, ch. engr.

Ill., Chicago — Dec. 2, by Bd. Comrs. Cook Co., County Bldg., paving, culverts 4.3 mi. Ashland Ave. from 119th to 123rd Sts., Kedzie Ave. from Granville St. to Devon Ave., Lincoln Ave. from Kedzie Ave. to Carpenter St., Kedzie Ave. from 71st to 79th Sts., Hillside Ave. from State Rd. 40 to Northwest Hy., Roselle Rd. from Higgins to Golf Rds., Crawford Ave. from 95th to 127th Sts., State St. from 123rd to 127th Sts., 55th St. from Archer to Cicero Aves., 76th St. from Cottage Grove to Dobson Aves., 111th St. from Kean to 96th Sts., Plum Grove Rd., at $40,000 per mile; paving 87th and 119th Sts., Central Rd., Franklin and Indiana Aves. at about $10,000 each. G. A Quinlan, 221 North La Salle St., engr.

Ind., Auburn—Dec. 2, by Bd. Comrs. De Kalb Co., grading, surfacing 5.2 mi. St. Joe-Spencerville Rd., Concord and Spencerville Twps. $135,135. E. Dawson, aud.

Ind., Laporte — Nov. 29, by Bd. Comrs. Laporte Co., concrete surfacing Fred Warnke Rd., Michigan Twp. $69,505. F. A. Hansheer, Laporte, aud.

Ind., Washington — Dec. 2, by Bd. Comrs. Davis Co., crushed limestone surfacing A. B. Clark Rd., $36,934; Edith B Ray Rd., $17,114. R. M. Moren, aud.

Iowa—Nov. 25, by State Hy. Comn., Ames, grading, flumes, paving 180,192 sq.yd. Rd. 71, F-155—75,412 sq.yd. Rd. 71, F-314, both Cass Co.—47,071 sq.yd. Rd. 14, F-19—97,677 sq.yd Rd. 58, F-315—171,277 sq.yd. Rd. 57, F-319, all foregoing Grundy Co.—53,564 sq.yd. Rd. 6, P-253 Marion Co.—13,360 sq.yd. Rd. 6, F-294 Monroe Co. — 68,310 sq.yd. Rd. 7, P-576 Pottawattamie Co.—gravel surfacing 3.191 mi. Rd. 18, P-656-C Lyon Co.—2.501 mi. Rd. 120, P-618 Montgomery Co.—12.1 mi. Rd. 1, P-306 Washington Co.—grading, drainage structures 5.312 mi. Rd. 16, P-681 Humboldt Co.—4.074 mi. Rd. 2, P-675 Marion Co. C. R. Jones, aud.

La., Tallulah—Nov. 29, by Police Jury Madison Parish, gravel surfacing 11 mi. Trinidad-Afton Hy. P. O. Benjamin, Tallulah, engr.

Maryland—Dec. 2, by State Roads Comn., G. C. Uhl, chn., Baltimore, concrete paving 2.4 mi. Federal Aid Project 197B-Reopened, Contr. W-58-63. Washington Co.; adv. E.N.-R. Nov. 20.

Mass., Boston — Dec. 2, by Hospital Dpt., driveways, sidewalks, parking spaces, sewerage, drainage, at Sanatorium Division, River St., Mattapan. $25,000 or more.

Mass., Boston—Nov. 24, by Dpt. P. Wks., J. A. Rourke, comr., sheet asphalt or bitulithic paving. $25,000.

Mass., Boston—Nov. 25, by Dpt. P. Wks., J. A. Rourke, comr., recut granite block paving Fargo and E Sts., East Boston. $25,000.

Minnesota—Dec. 5, by State Hy. Dpt., St. Paul, grading, culverts, concrete paving 9.9 mi. S.P. 3-46, Sect. 11, F.A.P. 307-C, S.P. 3-43, Div. A—25.3 mi. S.P. 6-31, Sect. 3, S.P. 3-56, F.A.P. 351-C, S.P. 3-32, F.A.P. 351-B, and S.P. 3-40, F.A.P. 351-A—21.4 mi. S.P. 8-23, Sect. 2, F.A.P. 155—18.7 mi. S.P. 8-26, F.A.P. 266, S.P. 8-28, F.A.P. 26, and S.P. 8-33, F.A.P. 276—11.1 mi. S.P. 15-30, Div. A, F.A.P. 341—13.5 mi. S.P. 15-30, Div. B, F.A.P. 341 and S.P. 14-27, F.A.P. 74—grading 7.6 mi. S.P. 4-49 Sect. 1, F.A.P. 99—16.2 mi. S.P. 9-45, Sect. 5, F.A.P. 38—11.4 mi. S.P. 12-27, Sect. 2, F.A.P. 423-A, and S.P. 334—12.2 mi. S.P. 12-27, Sect. 4, F.A.P. 10-B and S.P. 12-27.

Miss., Walthall — Dec. 1, by Hy. Comns. Mantee and Dancy Separate Road Dist. Webster Co., preparing sub-grade, hauling and spreading gravel on 1,800 cu.yd. Cumberland-Hohlenlinden Rd. from line between Supervisors Dist. 4 and 5 near Cumberland to precinct line near R. P. Cohen Pl.; graveling 1 mi. haul, 10,000 units gravel ½ mi. overhaul, 3.55 mi. Project 19 from Mathiston running west north of Columbus & Greenville R.R.

New Jersey—Dec. 8, by State Hy. Comn., Trenton, grading, 9 in. single line rein.-con. paving 1.876 mi. Route S-1, Sect. 2, from Route 5 to Hudson Co. Blvd., Bergen and Hudson Counties. A. L. Grover, ch. clk.

N. J., Caldwell—Nov. 25, by Bd. Freeholders Essex Co., Court House, Newark, grading Pier Lane, and cut-off from Sta. 31 to Fairfield Rd. and Two Bridges Rd., also new timber bridge. $25,000. W. Stickler, Newark, co. engr.

New York—Dec. 2, by C. MacDonald, engr., Westchester Co., Court House, White Plains, improving Parallel Route of Boston Post Rd., Co. Rd. 67-11, New Rochelle, Mamaroneck and Larchmont; adv. E. N.-R. Nov. 20.

New York—Dec. 4, by C. MacDonald, engr., Westchester Co., Court House, White Plains, improving Mill Rd., Co. Rd. 82, Eastchester and New Rochelle; adv. E. N.-R. Nov. 20.

N. Y., Marcy—Dec. 3, at office Dpt. Mental Hygiene, F. W. Parsons, comr., State Office Bldg., Albany, roads at Utica State Hospital, Marcy Division; adv. E. N.-R. Nov. 20.

N. Y., New York—Nov. 24, by J. Miller, pres. Manhattan Boro, Municipal Bldg., grading, sheet asphalt on concrete repaving Bway. (east side) except 10 in. strip to be paved with granite block—4 in. granite on concrete repaving Cooper Sq. (3rd Ave.)—widening, granite block repaving roadway 2nd Ave. at 50th St.—Canal St. and Bowery, incl. area abandoned island—sheet asphalt paving 116th St. at 3rd Ave.—86th St. at Columbus Ave.—grading, curbing, flagging, sidewalks sheet asphalt on concrete paving West 190th, West 183rd and West 141st Sts.

N. Y., Orangeburg — Dec. 3, at office Dpt. Mental Hygiene, State Office Bldg., Albany, concrete roads at Rockland State Hospital; adv. E. N.-R. Nov. 20.

N. Y., St. George—Nov. 26, by J. A. Lynch, pres. Richmond Boro, Boro Hall, furnishing, placing cinder and broken stone on roadway Nugent St., curbing, sidewalks, paving Davis Ave.

N. Y., White Plains—Dec. 3, by C. MacDonald, engr. Westchester Co., Court House, improving Bway., Co. Rd. 87; adv. E. N.-R. Nov. 20.

O., Columbus—Nov. 26, by Comrs. Franklin Co., grading, brick paving ¼ mi. 60 ft. section and bituminous macadam paving ¼ mi. 30 ft. section Olentangy Blvd. $69,980. C. C. Lathimer, Court House, engr.

Oklahoma—Nov. 25, by State Hy. Dpt. Oklahoma City, grading, drainage structures 13.1 mi. State Hy. 9, 34 ft., Greer Co. $52,000. A. R. Losh, ch. hy. engr.

Pa., Pittsburgh—Nov. 21, by E. G. Lang, dir. P. Wks., City-County Bldg., grading, curbing, paving Horace St. from Liberty Bridge to point 160 ft. north of Blvd. of Allies, Contr. 1. $52,000. C. M. Reppert, City-County Bldg., engr.

Rhode Island—Nov. 26, by State Bd. Pub. Roads, Providence, bituminous macadam (penetration method) paving ½ mi. hy. South Kingstown, Constr. 3035—1.7 mi. hy. Johnstown, Contr. 3036 — rein.-con. paving 1.2 mi. hy. Narraganstt, Contr. 3037, all foregoing 20 ft.; adv. E.N.-R. Nov. 20.

Utah—See "Contracts Awarded."

Washington—Dec. 9, by S. J. Humes, dir. Hys., Olympia, grading 2.8 mi. State Rd. 8, F.A.P. 174-B, from Grand Dalles to Spearfish, Klickitat Co.; crushed stone resurfacing 20.5 mi. State Rd. 9, end of pavement to Humptulips, Grays Harbor Co.

Wyoming — Nov. 25, by State Hy. Comn., Capitol Bldg., Cheyenne, graveling 2.902 mi. F.A.P. 34-B, Cokeville-Star Valley Rd., Lincoln Co.—3.586 mi. F.A.P. 176-B, Greybull-Lovell Rd., Big Horn Co.—4.652 mi. F.A.P. 204-A, Wheatland-Bosler Rd., Platte Co.—5.664 mi. F.A.P. 180-D and 188-B, Granger-Lyman Rd., Uinta Co.—7.078 mi. Granger-Kemmerer Rd., Sweetwater Co.—29.416 mi. F.A.P. 138-D and 138-B, Cheyenne-Pine Bluffs Rd., Laramie Co.—3.86 mi. F.A.P. 108-D, Worland-Tensleep Rd., Washakie Co. — shalc surfacing 10.588 mi. F.A.P. 132 and 155, Moorcroft-Carlile Rd., Crook Co.—crushed rock surfacing 26.622 mi. F.A.P. 189-C, 189-D, and 30 and S.P. 874, Midwest - Kaycoo Rd., Natrona and Johnson Counties.

Ont., Goderich—See "Contracts Awarded."

CONTRACTS AWARDED

Arizona — State Hy. Comn., Phoenix, improving 2 mi. Florence-Tucson Hy., F.A.P. 94-C, Schedules 2 and 3, to Stanley Jaicks Co., Oak Park, Ill., $34,275. Noted Oct. 17 Daily.

Calif., Glendale—City Council, curbing guttering, storm drains, sidewalks, 8 in. concrete paving 400,000 sq.ft. San Francisco Rd. through city limits, to J. Papac, 726 North Hill St., $183,690. Noted Oct. 23.

Calif., Los Angeles—Grading, concrete paving Sunshine Terrace and Blue Canton Dr. Impvt. Dist., to A. D. Chalmers, 3051 Coolidge Ave., $109,650.

Calif., Los Angeles — Bd. Supervs. Los Angeles Co., grading, lighting system, asphaltic concrete paving 250,000 sq.yd. County Impvt. 937-Doheny Dr., to Hollywood Paving Co., 8525 West 3rd St., $43,375 — grading, concrete paving A. and I. 17, Old River School Rd., to Griffith Co., Railway Bldg., $52,315—clearing 65 acres state hy. between La Canada and Colby Canyon, force account. Noted Oct. 20.

Calif., Los Angeles—Bd. Supervs. Los Angeles Co., grading, 2 in. Warrenite on 4 in. asphaltic concrete paving 505,000 sq.ft. A and I No. 75 Sunset Blvd. and Ellis Lane, to Hall-Johnson Co., 905 Westminister St., Alhambra, $116,775. Noted Oct. 9.

Calif., Los Angeles—Los Angeles Co., asphalt paving 2nd St. south of Arcadia, to Griffith Co., Railway Bldg., $25,081; paving Main St. between Norwalk and Artesia, to Curtis Paving Co., 2440 East 26th St., $90,448.

Idaho—J. D. Woods, comr. P. Wks., Boise, supplying 22,000 cu.yd. crushed gravel surfacing in stock piles and bunkers for graveling 15 mi. Sawtooth Park Hy. to H. E. Reed, Twin Falls, $15,380. Noted Oct. 24 Daily.

Ill., Alton—Grading, curbing, slab concrete paving Lincoln, Douglas, McPherson, 17th and Maple Sts., to Strubel & Helmich, 1852 Evergreen St., $35,811.

Ill., Chicago—Bd. Local Impvts., City Hall, to P. J. O'Brien & Co., 4 North Cicero St., grading, curbing, guttering, sewers, 8 in. concrete paving Gregory St. $10,008; Cornelia Ave. $7,981; Cullom Ave. $16,616; Kongoe Ave. $9,986; Wilson Ave. $13,674 — to Paramount Constr. Co., 82 West Washington St., Lamon Ave. $23,854; Berwin and North Leamington Aves., $20,563; East 82nd St., Manistee and Marquette Aves. $28,860 — to John Dillon & Co., $2,953 South Halstead St., West 79th Pl., $12,119—to White Paving Co., 1735 Fullerton Ave., grading, curbing, guttering, sewers, asphalt on 6 in. concrete paving Ainslee St. $5,817; Albion Ave. $20,672—to R. F. Conway Co., 33 North La Salle St., East 98th St. $16,325; grading, reshaping present macadam surfacing to serve as foundation, asphaltic concrete repaving Sidney Ave. $2,759—to J. M. Bransfield, 3525 Wacker Dr., South Leavitt St. $15,616. Grand total $204,850. Noted Oct. 16.

Ill., Sparta — Grading, drainage structures, culverts, bridges 5 mi. Sparta-Evansville Rd., to Moore Bros. Constr. Co., 200 St. Clair Ave., East St. Louis.

Kansas—State Hy. Comn., Topeka, at Court House, Osborne, to Frazier Constr. Co., Pittsburg, mortar bed surfacing 5.142 mi. Project 40N-14-Federal Aid Project 371-C, Osborne Co. $7,666; 5.429 mi. same road, Sect. B, $6,723; 5.464 mi. Rooks Co. $8,360—to D. G. Hanson, Logan, sand gravel surfacing 15 mi. Sheridan Co. $17,010—to D. H. Hardman, Alton, 8.977 mi. Thomas Co. $13,463. Grand total $53,222. Noted Oct. 19.

Kansas — State Hy. Dpt., Topeka, at Court House, Newton, to Schultz Constr. Co., Wichita, re-gravel surfacing 4 mi. road in Barber Co. $1,400; 2.5 mi. Harper Co. $850—to M. W. Watson, Topeka, 7 mi. Comanche Co. $4,158; 16.7 mi. Clay and Geary Counties $13,560—to E. Graff, Newton, 8 mi. Harvey Co. $3,360—to W. F. O'Brien, St. Paul, 3 mi. Kansas Project 7169, $870; 5 mi. Kansas Project 7162 $480, both Crawford Co.— to Western Bridge & Constr. Co., 3867 Leavenworth St., Omaha, Neb., 7.5 mi. Montgomery Co. $4,510; 6 mi. Chautauqua Co. $2,680—to Thogmartin & Reis, Ft. Scott, 9 mi. Cowley Co., $2,790; 7 mi. Kansas Project 7156, $819; 5 mi. Kansas Project 7154, $585; 2 mi. Kansas Project 7160, $258, all Cherokee Co.; 8 mi. Sedgwick Co. $2,768; 5 mi. Linn Co. $1,880; sand gravel surfacing 10 mi. Washington Co. $7,780—to E. M. Eby, Wellington, sand gravel or chats surfacing 3.514 mi. McPherson Co. $5,557. Grand total $54,305.

Kansas—State Hy. Dpt., Topeka, at Court House, Eureka **(F.A.P. means Federal Aid Project and K.P. Kansas Project)**, to Cook & Cone, Wichita, sand gravel re-surfacing 8.5 mi. roads in Harvey Co. $3,502; 20 mi. Washington Co. $11,208; 4.04 mi. F.A.P. 426 A, $5,418; 13.632 mi. F.A.P. 398-B, $17,383, both Rush Co.; 3.5 mi. Butler Co. $1,736; 15 mi. Reno Co. $4,650; 18 mi. Neosho Co. $1,530; 6.5 mi. K.P. 7159 $2,925; 13 mi. K.P. 7158 $5,980, both Greenwood Co.; 3 mi. K.P. 7150 $1,482; 4.6 mi. K.P. 7149 $818; 3.5 mi. K.P. 7164 $830, all Franklin Co.; 8.5 mi. Sedgwick Co. $4,560—to San Ore Constr. Co., McPherson, 5 mi. K.P. 7135 $1,440; 5.5 mi. K.P. 7121 $1,540, both Pratt Co.; 8 mi. K.P. 7127 $2,560; 5 mi. K.P. 7126 $1,600, both Edwards Co.—to C. Hume, Great Bend, 5 mi. Barton Co. $1,900; 3 mi. Stafford Co. $1,290—to Walsh Lumber Co., St. John, 5 mi. Stafford Co. $4,050—to Roberts Constr. Co., Wichita, 5 mi. K.P. 7152 $2,370; 5 mi. K.P. 7151 $1,880, both Coffey Co.; grading, culverts 2.749 mi. Harvey Co. $11,823—to Globe Constr. Co., Wichita, grading, drainage structures, bridges, culverts 0.514 mi. Sedgwick Co. $24,306. Grand total $116,781.

Kansas—State Hy. Comn., Topeka, at Court House, Salina, to Meade & Hardman, Alton, grading, drainage structures, culverts 4.155 mi. roads in Jewell Co. $21,596—to Schultz Constr. Co., Wichita, sand gravel or chats surfacing 15 mi. Chase Co. $7,125—to Reed & Wheelock, Clay Center, sand clay surfacing 3.023 mi. Dickinson Co. $4,626, 12.5 mi. Kansas Project 997 $9,750; 1.909 mi. Kansas Project 998 $1,986, both Clay Co.—to Cecil & Vogler, Barnes, 14 mi. Washington Co. $9,464 — to Bateman Contg. Co., Nashville, Tenn., Clay Co. $70,435—to Cook & Stucker, Ottawa, concrete surfacing 8.543 mi. Saline Co. $175,150. Grand total $300,132. Noted Oct. 9.

Kansas—State Hy. Dpt., Topeka, at Court House, Winfield, grading, culverts 3.668 mi. U. S. Rd. 77, Federal Aid Project 230 D, and 3.485 mi. same road Sect. B, to A. L. Cook, Ottawa. $32,091 and $24,013 respectively. Noted Oct. 23.

Kan., Kansas City—H. Payne, city clk., grading, curbing, guttering, asphaltic concrete on 8 in. concrete paving State Ave. from 9th to 17th Sts., to J. A. Wetterstrome, 1615 Main St., $82,690.

Kan., Kansas City—Grading, curbing, guttering, 3 in. brick on 8 in. concrete paving 60,000 sq.yd. 7th St. from Washington St. to Montana Ave., asphaltic concrete on 6 in. concrete paving 7th Ave. from 9th to 17th Sts., to E. J. Wetterstrom, 1615 Main St., $236,652 and $82,690 respectively; paving Shawnee St. from Douglas to Ruby Sts. and grading for new buildings on old waterworks site, to Rand & Son Constr. Co., 1030 Shawnee Rd., $5,873. Grand total $325,125.

Kan., Topeka—Shawnee Co., concrete paving 0.586 mi. 29th St., 18 ft., and 2 in. asphaltic concrete old macadam surfacing 2.014 mi. West 6th St., 19 ft., to Kaw Paving Co., 616 New England Bldg., $11,518 and $24,295 respectively; substructure for 110 ft. through truss span bridge on Elmont-Rossville Rd., incl. 95,000 lb. structural steel, to F. M. Spencer & Son, 1805 Harrison St., $5,268. Grand total $41,081.

Constr. News page 210

Streets and Roads (Continued)

Louisiana—State Hy. Comn., **Baton Rouge**, grading, local material surfacing 8 mi. Route 225 between Fairview Alpha School and Route 9, Red River Parish, to S. B. Boyd, Columbia, Miss., $46,798.

Louisiana — State Hy. Comn., Baton Rouge, grading, gravel surfacing 6.9 mi. roads in Lincoln Parish, to Lawrence & Tatum, Dubach, $63,979—5 mi. Madison Parish, to Robinson Constr. Co., Centerville, $46,610—5.3 mi. Sabine Parish, to C. E. Collins, Natchitoches, Miss., $20,232—5 small bridges in St. Helena Parish, to W. M. Easly, Magnolia, Miss., $5,207. Grand total $136,028. Noted Oct. 9.

La., New Orleans — City Council, concrete curbing, warrenite bitulithic on 6 in. concrete paving 2,295 ft. South Roman St., 30 ft. to Craven & Lang, New Orleans Bank Bldg., $38,390; concrete curbing, Uvalde rock asphalt wearing surface on 6 in. concrete paving 5,030 ft. Laharpe St., to Southern Uvalde Co., New Orleans Bank Bldg., $81,930.

La., New Orleans — Concrete curbing, warrenite bitulithic on 6 in. concrete paving 8,740 sq.yd. Desire St. from Marais to Tonti Sts., to Craven & Lang, New Orleans Bank Bldg., $54,080.

La., New Orleans — Concrete cast curbing, bitulithic concrete on 8 in. concrete paving 5,750 sq.yd. North Derbigney St. from Canal St. to South Claiborne Ave., 32 ft., to Craven & Lang, New Orleans Bank Bldg., $33,170.

Maryland — State Roads Comn., Baltimore, graveling 3.67 mi. Contr. P-122-84, Prince George's Co., to L. R. Colbert, Fredericksburg, Va., $23,482.

Massachusetts—Dpt. P. Wks., Boston, bituminous macadam paving 3,850 ft. hy. Millis, to Revere Excavating Co., Inc., 16 Allston St., Revere, $10,049. Noted Nov. 6.

Mass., Boston—Dpt. P. Wks., J. A. Rourke, comr., bitulithic paving Weld St., Ward 20, West Roxbury, to A. A. Doyle, 44 Perkins St., $19,123. Est. $25,000. Noted Oct. 30.

Mass., Cambridge—At office W. H. McMenimen, supt., streets, City Hall, sheet asphalt paving, to Simpson Bros. Corp., 77 Summer St., Boston. Est. $250,000 or more. Noted Oct. 9.

Michigan — R. H. Havens, resident engr., Jackson, grading, drainage structures, concrete surfacing 4.839 mi. MO46-19, Contr. 1, and 1.956 mi. Contr. 2, 20 ft., Lenawee Co., to Hilding Constr. Co., Standish, $123,235 and $53,465 respectively, for State Hy. Comn., Lansing. Noted Sept. 18.

Mich., Detroit—Concrete curbing, 3½ in. sheet asphalt on 8 in. concrete paving 12,830 sq.yd. Bishop Rd. from Warren to Harper Aves., to Detroit Asphalt Paving Co., 909 Transportation Bldg., $41,045.

Minnesota—State Hy. Dpt., St. Paul, to C. Weaver, Anoka, concrete paving 18 mi. S.P. 12-27, Sect. 1, F.A.P. 385A, S.P. 12-34 Sect. 1, F.A.P. 103, and S.P. 12-34, Sect. 2, Div. A, F.A.P. 350E, $284,010; 18.7 mi. S.P. 12-34, Sect. 2, Div. B, F.A.P. 350E, and S.P. 12-34, Sect. 3, F.A.P. 350D, and S.P. 12-26, Sect. 2, F.A.P. 350C, $295,405; 11.1 mi. S.P. 46-21, Sect. 1, F.A.P. 384C, $168,657—to S. J. Reader & Co., 325 Kasota Bldg., Minneapolis, 16.5 mi. S.P. 2-34, F.A.P. 386A, $245,846—to Hallett Constr. Co., Crosby, 21.3 mi. S.P. 18-23, Sect. 2, F.A.P. 3B, $411,827. Grand total $1,405,745. Noted Oct. 23.

Missouri—State Hy. Bd., Jefferson City, to Nevada Constr. Co., Nevada, chat surfacing 2.689 mi. Route SE, Sect. 1 $10,409; 2.682 mi. Sect. 2 $7,017, both Vernon Co.; 3.845 mi. Route SA, Sect. 3 $17,139; 3.485 mi. Sect. 4 $14,616, both Bates Co.—to M. Wunderlich, 734 Snell Ave., St. Paul, Minn., 3.747 mi. Route 39AP, Sect. 16 $26,386; 3.143 mi. Sect. 17 $26,558; 2.577 mi. Sect. 18 $23,797; 2.166 mi. Sect. 19 $22,605, all foregoing Lawrence Co.; graveling 2.68 mi. Route 44, Sect. 239A $21,641; 2.795 mi. Sect. 329B $25,879; 4.616 mi. Sect. 329C $31,306; 4.003 mi. Sect. 329D $36,407; 3.89 mi. Sect. 329E $29,625; 4.037 mi. Sect. 329F $21,537, all foregoing Barry Co.; 2.813 mi. Route 60, Sect. 64B, Carter Co. $72,168; 2.338 mi., Morgan Co. $36,772; 1.655 mi. Route 63, Sect. 107A $32,846; 3.887 mi. Route 19, Sect. 57 $25,462, 3.413 mi. Sect. 58 $21,143, all foregoing Oregon Co.; 2.597 mi. Route 78, Sect. 5 $31,699, 2.418 mi. Sect. 6 $13,276, 2.51 mi. Sect. 7 $10,752, 2.516 mi. Sect. 8 $21,679, all foregoing in Taney Co.; 4.975 mi. Route 19, Sect. 61, Ralls Co. $38,935; grading 4.26 mi. Route 107AP $13,536; 4.603 mi. Sect. 2 $55,791, both Monroe Co. — to Kelly & Underwood, Granby, 2.179 mi. Route 71AP, Jasper Co. $13,133; 3.698 mi. Route 71AP, Sect. 118 $17,254; 3.676 mi. Sect. 119 $28,342; 3.167 mi. Sect. 120 $51,129, all Newton Co. —to Pittsburgh-Des Moines Steel Co., Tuttle and Southwest 10th Sts., Des Moines, Ia., 1.97 mi. Route SZ, Sect. 3, Platte Co. $7,530—to H. Tidd, Hutchinson, Kan., 5 mi. Howard Co., $18,566—to C. W. Rose, Brookfield, stone surfacing 2.367 mi. Clinton Co., $8,361 — to O. O. Fuller, Nevada, graveling 0.117 mi. McDonald Co., $2,107—to C. K. Kost, Joplin, 1.088 mi. Webster Co., $1,565—to Lahar Bros., Boonville, 1.12 mi. Dunklin Co., $6,280—to Birmingham & Jones, St. James, 3.524 mi. Phelps Co., $12,217—to Carle Harlin Constr. Co., West Plains, 0.534 mi. Howell Co., $4,401—to H. H. Ruddel, Springfield, 4.692 mi. Shannon Co., $34,087—to Knox & Penzel, Jackson, 30.48 mi. Cape Girardeau Co., $20,003—to E. W. Deering, St. Louis, 4.913 mi. Ray Co., $14,426—to W. K. Ferman, La Plata, 4.215 mi. Linn Co. $19,259; Route SA, Sect. 2, Andrew Co., $7,132—to List & Weatherly, Railway Exch. Bldg., Kansas City, 0.351 mi. Platte Co. $13,063; grading, concrete surfacing 4.028 mi. Caldwell Co., $35,611—to T. A. Tobin Constr. Co., 7601 Myrtle Ave., Kansas City, 4.14 mi. Greene Co., $83,235—to G. W. Condon Co., 233 Grain Exch. Bldg., Omaha, Neb., 0.51 mi. Howard Co. $13,571—to Forcum James Co., Dyersburg, Tenn., 4.964 mi. Pemiscot Co., $92,935. Grand total $1,193,188. Rejected bids Oct. 31, graveling 5 mi. Phelps Co. Noted Oct. 23.

Mo., St. Louis — Bd. P. Serv., City Hall, Berthold St., to Carlo Motor Service Co., 4126 Olive St., $5,752 est. $11,600; Newstead and Oriele Aves., to J. T. McMahon, 4606 Moraine Ave., $3,986 and $867 respectively, est. $9,900 and $1,960 respectively. Grand total $10,605. Noted Sept. 25.

N. M., Clovis—Devlin Eng. Co., engrs., Fish Bldg., Amarillo, Tex., 1¼ in. Uvalde rock asphalt on 6 in. caliche paving main streets, for City, to Zempter Constr. Co., Amarillo, Tex., $67,154. Noted Nov. 5. Daily.

New York — A. W. Brandt, comr. Hys., Albany, concrete paving 4.58 mi. Westchester Co., to P. Luciano & Son, Inc., 185 Main St., White Plains, $577,937 est. $894, 750—4.95 mi. Orange Co., to J. Piro & Sons., Inc., Mount Vernon, $199,704 est. $292,278 — 2.28 mi. Suffolk Co., to H. W. Patterson, Ellicott Sq., Buffalo, $114,895 est. $161,128 — 0.68 mi. Tompkins Co., to Bolton, Suits & Bolton, & Gibbs, Watkins Glen, $28,850 est. $38,057—grading 1.23 mi. Nassau Co., to Good Roads Eng. & Contg. Co., Hempstead, $83,644 est. $134,338 — bituminous macadam paving 0.39 mi. Schoharie Co., to M. E. Colle, Inc., Leroy, $20,989 est. $32,272. Grand total $1,026,021. Noted Sept. 25 and Oct. 5.

N. Y., Brooklyn—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, grading East 48th St., to Castle Bros., Johnson Pl., $3,496—granite block paving 12th St., to C. R. Contg. Co., 2266 Gravesend Ave., $12,731—asphalt paving East 23rd and 6th Sts., to Brooklyn Alcatraz Asphalt Co., 407 Hamilton Ave., $3,015 and $26,626 respectively—East 55th and 88th Sts., to B. Turecamo, New Cropsey Lane, $8,200 and $5,558 respectively—Lincoln Pl., to D. J. McCoy Asphalt Co., Avenue U and East 57th St., $6,211—North 4th and Ross Sts., to Uvalde Asphalt Paving Co., Metropolitan Ave., $3,721 and $9,419 respectively—15th St., to Leonard Paving Co., 233 Bway., New York, $70,465—fencing on Montauk Ave., to J. and M. Moran Excavating Co., 413 Sterling St., $1,343. Grand total $150,785. Noted Oct. 30.

N. Y., Irondequoit—Town Bd., underground work in St. Paul Blvd., to W. J. Irwin & Son, Buffalo, $83,299.

N. Y., Long Island City—G. U. Harvey, pres. Queens Boro, Queens Subway Bldg., sheet asphalt paving 54th Ave., to Carbloc Paving Co., Stagg St., Brooklyn, $7,060. Noted Sept. 25.

N. Y., New York—J. Miller, pres. Manhattan Boro, Municipal Bldg., granite block repaving 9th St., to Columbia Contg. Co., 401 Bway., $134,482; asphalt paving West End Ave., to E. T. Barry Co., 12606 139th Ave., Laurelton, $127,024. Noted Oct. 16

N. Y., New York—H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., grading Eastern Blvd., to Courtland Foundation Co., 3157 Park Ave., $37,006. Noted Oct. 30.

N. Y., New York—J. Miller, pres. Manhattan Boro, Municipal Bldg., asphalt paving Beekman Pl., to C. D. Beckwith, Inc., Seneca Ave. and Edgewater Rd., $22,456. Noted Oct. 30.

North Dakota—State Hy. Comn., Bismarck (a) grading (b) graveling (c) structural work (d) corrugated metal culverts (e) concrete pipe culverts on (1) 9.578 mi. McHenry Co. (2) 12.35 mi. LaMoure and Dickey Counties (3) 10.149 mi. Nelson Co. (4) 8.665 mi. Williams Co. (5) 7 mi. McLean Co. (6) 6 mi. Wells Co. (7) 11 mi. Grand Forks Co. (8) Grand Forks and Wabash Counties (9) Grand Forks Co. (10) 12.349 mi. Stutsman Co. (11) 3.257 mi. Williams Co. to Schultz Bros., Bowbells (a1) $33,694 (c4) $4,745 — to Dakota Concrete Co., Minot (c1) $4,339 — to North Dakota Metal Culvert Co., Fargo (d1) $2,090 (d3) $4,451 (d5) $511 (d8) $4,276 (d11) $1,096 — to North Dakota Concrete Products Co., Mandan (e1) $1,342 (e5) $1,991 (e11) $2,719—to Haas Contg. Co., Minot (a2) $29,536—to Klauer Mfg. Co., Dubuque, Ia. (d2) $1,382 — to Concrete Sectional Culvert Co., Fargo (e2) $2,321 (e8) $3,371—to W. Collins, Lakota (a3) $20,143 — to C. Lindberg, Jamestown (c3) $5,311 — to Hall & Booth, Stanley (a4) $24,762 — to Steig & Olson, Esmond (a11) $9,989—to W. Schultz, Fergus, Falls, Minn. (a5) $20,430 — to W. H. Noel, Jamestown (a6) $10,293; (a7) $21,196 — to J. A. Jardine, Fargo (c9) $6,132—to Interstate Constr. Co., Aberdeen, S. D. (b10) $11,294. Grand total $228,766.

Oklahoma—State Hy. Dpt., Oklahoma City, grading, paving 1.37 mi. approaches to Red River Bridge, U. S. Hy. 77, Love Co., 20 ft., to Scott & Bybee, Yukon, $15,171. Est. $30,000.

Okla., Nichols Hills (P. O. Oklahoma City)—Grading, paving 9 blocks Tedford Way, 20 ft., and 14 blocks Huntingdon Dr., 24 ft., to Connelly Bros., El Reno, $28,013 and $35,235 respectively, est. $30,000 and $38,000 respectively. Noted Nov. 6.

Okla., Tulsa—Grading, curbing, paving Street Impvt. Dist. 1058, to Calumet Constr. Co., 840 East Apache St., $25,778. Est. $26,158.

Pa., Pittsburgh—E. G. Lang, dir. P. Wks., grading, curbing, paving Suisman St., to Harrison Constr. Co., 2101 Sidney St., $3,947—15th St., to Domenick Pavia, 331 Ladson St., $15,340—Shore Ave., to Booth & Flinn, 1942 Forbes St., $35,978—Wilkins Ave., to M. O'Herron Co., South 1st and McKean Sts., $6,874—Kalorama Way, to McDonough & O'Toole, 514 Climax St., $5,586—Maple Ave., to Parkview Constr. Co., 373 Boquet St., $4,950. Grand total $72,675.

Tex., Amarillo—E. N. Stanley, engr., City Hall, concrete curbing, guttering, 6 in. limestone base paving 15,000 sq.yd. in County Club Addition, to Gober-Thompson, 21 Massie Bldg., $39,870. Noted Nov. 6.

Tex., Austin—Travis Co., c/o G. S. Matthews, judge, to F. P. Holt, Marble Falls, hauling, gravel surfacing Manda-Kimbro Rd., $10,012; 5.4 mi. New Sweden-Lund Rd., $30,126 — Pflugerville-Cameron Rd. and Lund North Rd., $23,330—to R. Canion, 1412 South 1st St., Hodde-Lane Rd., $3,720 — to J. W. Gwinn, Comer. Bldg., Birmingham, Ala., Cameron Rd., $16,046. Grand total $83,234. Noted Oct. 30.

Utah—State Rd. Comn., Salt Lake City, grading, oil processing 2.1 mi. Parleys Canyon Rd., part of Lincoln Hy., Salt Lake Co., day labor, $25,000. H. S. Kerr, state road engr.

Virginia—State Hy. Dpt., Richmond, concrete paving 4.963 mi. roads in Norfolk and Nansemond Counties, to Brooke Constr. Co., Norfolk $111,735. Noted Oct. 1.

B. C., Douglas—Dpt. P. Wks., Victoria, clearing, grading 7 mi. new road from Douglas at Peace Arch to Ladner Trunk Rd., 40 ft., $300,000. Work may be done by day labor under unemployment scheme. P. Philip, Dpt. P. Wks., Victoria, engr.

Ont., Goderich—Council, widening, straightening Saltford Hill Rd., constructing new road to north side Harbor, curbing, guttering around square and macadamizing several streets, day labor to relieve unemployment. $28,000. H. J. MacEwan, chn. com.

Ont., Toronto—City Council, asphalt paving Eglinton Ave. W., Lascelles Blvd. and Bedford Park Ave., to Godson Contg. Co. Ltd., 204 Richmond St. W., $43,742 and $31,571 respectively —Burnaby Blvd., to Kilmer & Barber, Harbor Bldg., $4,759—Hillholme Rd., by day labor, $1,547. Grand total $81,619.

EXCAVATION, DRAINAGE, IRRIGATION, LEVEES, RIVER AND HARBOR

PROPOSED WORK

Ill., Erie — Whiteside Rock Island Special Drainage Dist., 30 mi. ditch work, 800,000 cu.yd. excav. and 180,000 g.p.m. pump station. Caldwell Eng. Co., Jacksonville, engrs.

Ill., Quincy—Bd. Comrs. Indian Grave Drainage Dist., enlarging Bear Creek Channel, incl. 70,000 cu.yd. excav. $25,037. W. J. Smith, Quincy, co. clk.

La., New Orleans—Orleans Levee Bd., Camp and Common Sts., A. L. Shushan, pres., 7,500 lin.ft. levee on west bank Mississippi River from Delacroix to Beka, $85,000, **maturity in spring;** 4,900 ft. Dumaine Street Levee from Bienville St. to Esplande Ave., $195,000; 2,000 lin.ft. seawall on each side Bayou St. John, $328000; extending lakeshore seawall into New Basin Canal and Bayou St. John to locks and on Orleans Canal and London Ave. canal for distance 700 ft. back of end of seawall, $215,000. J. Klorer, c/o owner, engr.

N. J., Brigantine — Bd. Freeholders Atlantic Co., Guarantee Trust Bldg., Atlantic City, 96,000 ft. timber bulkheads at Brigantine bridge, $25,000. A. H. Nelson, 741 Guarantee Trust Bldg., Atlantic City, co. engr.

Okla., Arcadia — Oklahoma Co. preliminary plans Deep Fork D. D. 14, $35,000. R. S. James, 5194 West Main St., Oklahoma City, engr.

Tex., Brady—City, 1 mi. levee, river overflow protection, 200 ft. strip of land on south bank of stream will be used to widen river; 3 ft. rein.-con. wall, 40 ft. scenic paved driveway. $200,000. E. A. Barrow, Brady, engr.

Tex., Bronte—A. E. Shepard, Winters, F. O. Rey, Bronte, and H. C. Allen, Robert Lee Assoc., Bronte, irrigating 150,000 acre tract, Municipal Eng. Co., Athletic Bldg., Dallas, engrs.

Ont., Erieau—Harwich Twp., flood prevention and reclamation project incl. dikes, pumping equipment, near here. $100,000. W. G. McGeorge, Bank of Commerce Bldg., Chatham, engrs.

Ont., Sudbury—City Council, 20,000 dry rock excav. in Baker, John, Mountain, Kathleen, Keziah, McKenzie, and Patterson Sts. $41,600. W. McMullen, Mackie Blk., engr.

BIDS ASKED

Calif., San Francisco—Dec. 19, by S. J. Hester, secy. Bd. P. Wks., City Hall, improving Sect. A Alemany Blvd., incl. 100,000 cu.yd. excav. $55,000.

Illinois—Nov. 28, by Bd. Comrs. Union D.D. 1, South Homer Twp., Champaign Co. and Sidell Twp., Vermilion Co., at Fairfield School, Route 49, near Homer, excavating 11,652 ft. open ditch containing 17,018 cu.yd. Fisher & McCann, Danville, engrs.

Constr. News page 211

Excavation, Drainage, Irrigation, Levees (Cont.)

Ill., Chicago — Nov. 26, by Lincoln Park Comrs., Clark and Center Sts., L. M. Thomas, secy., retaining wall, dredging for Montrose Harbor; constructing breakwater and jetty for extension Lincoln Park; adv. E. N.-R. Nov. 20. Noted Oct. 9, under "Sports and Parks."

Ill., Paxton—Nov. 25, by Bd. Comrs. Sugar Creek Drainage Dist. at office Thompson & Martensen, attys., 1st Natl. Bank Bldg., redredging upper 13,000 ft. main open ditch, incl. 19,055 cu.yd. excav., 816 ft. 18 in. tile. Hollister & Walker, Loda, engrs.

Ind., Goshen—Dec. 4, by J. H. Brown, constr. comr., Horn Ditch and 5 laterals, Benton, Clinton and Elkhart Twps., Elkhart Co., incl. 13,100 lin.ft. 8- to 36-in. tile, 6 catch basins, 40 sq.yd. rip rap, 88,682 cu.yd. excav. $18,379.

N. J., Verona—Nov. 25, by Bd. Freeholders Essex Co., Hall of Records Bldg., Newark, placing embankment for widening Pleasant Valley Way along Essex Co. Park property from Sta. 0.50 to Sta. 30-50. $25,000. W. Stickler, Newark, co. engr.

CONTRACTS AWARDED

California—Waterfront Development Co., c/o R. L. Vaughn, engr., 461 Market St., San Francisco, 12,640 ft. seawall from point near Ford plant in Richmond to point near Key Route Mole in Oakland, incl. 25,000 tons rock, to Daniel Contg. Co., 303 Market St., San Francisco, $392,000. Noted Oct. 1, under "Berkeley."

Calif., Long Beach—City, bulkheads at Berths 3 and 11, to Merritt-Chapman & Scott, 720 Wilmington Blvd., San Pedro, $49,700.

Calif., San Francisco—Western Pacific R.R. Co., Mills Bldg., 450,000 cu.yd. unclassified excav. mostly rock, in connection with Industrial Yard in Islais Creek Dist., to M. Rosenberg, 1755 San Bruno Ave.

Ind., Anderson — Constructing Myrtle E. Bronnenberg Drain, incl. 2,759 cu.yd. excav., 4,570 ft. 12 and 14 in. tile, to H. C. Garland, 52 Ridgeview Dr., Indianapolis.

Ind., Shelbyville—Shelby Co., Phillips Drain, 9,500 ft. 12- to 24-in. tile, to W. Goodman, Franklin.

Ind., Winamac—Pulaski Co., M. P. Hill Ditch, Salem and Monon Twps., incl. 240,379 cu.yd. dirt, 10,821 cu.yd. hard pan and 12,490 cu.yd. rock excav., to E. M. Melahn Constr. Co., Algonquin, Ill. Noted Oct. 23.

Kan., Kansas City — Kaw Valley Drainage Dist., Wyandotte Co., 719 Osage Ave., furnishing, installing 50 m.g.p.d. electric motor driven vertical shaft pumping unit, to West Side Machine Wks., 3rd St. and Minnesota Ave., $17,208.

Louisiana — Caddo Levee Dist., c/o N. K. Peatross, secy., Court House, Shreveport, 7,612 ft. Shreve Island Levee, right Bank Red River, 6 mi. below Shreveport, incl. 107,000 cu.yd., and 6,396 ft. Eagle Bend Levee, right bank Red River, 9 mi. below Shreveport, incl. 145,000 cu.yd., to New Constr. Co., Echo, at $0.152 per cu.yd.

Mich., Saginaw — Constructing Abbe Drain, incl. 3.07 mi. open ditches, 38,000 cu.yd. excav., to E. J. Geyer, Ashley.

N. Y., Brooklyn—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, dredging in Fresh Creek Basin, Paerdegat Basin and in Hendrix St. Outlet Channel, to A. M. Hazelt, Inc., 26 Courtland St., New York, $21,200. Noted Oct. 30.

Okla., Purcell—McClain Co., constructing McClain County D.D. 1, incl. main ditch up Walnut Creek, laterals, 1,000,000 cu.yd. excav., to J. D. Mann Constr. Co., Petroleum Bldg., Oklahoma City.

Tex., Brownwood—Bd. Directors Brown Co. Water Impvt. Dist. 1, earthen reservoir dam spillway, appurtenant works, across Pecan Bayou, 8 mi. from here, to Standard Paving Co., Majestic Bldg., Fort Worth, $590,003. Noted Oct. 2.

Public Bond Elections

Coming Bond Elections

Waterworks Impvts.—Utah, Smithfield, $50,000.
Sewerage System — Tex., San Marcos, Dec. 9, $130,000.
School—Colo., Los Animas, Nov. 28, $200,000.
Schools—La., Hahnville, Dec. 3, $360,000.

Bonds Voted

Waterworks Impvts. — N. D., Minot, G. A. Reishus, City Aud., $75,000.
Sewers and Disposal Plant—Kan., Wichita, Black & Veatch, Kansas City, Mo., Engrs., $700,000.
Sewage Disposal—Mich., Flint, $643,000.
Sewer Impvts.—Mich., Hamtramck, $500,000.
Sewage Disposal—Pa., Pottstown, $500,000.
Sewerage System, Ex., Waterworks & Paving—Tex., La Feria, $35,000.
Airport—La., New Orleans, Levee Dist., $1,000,000.
Hospital—N. Y., Nassau County, $1,750,000.
Jr. High School—Pa., Springfield, $170,000.
Schools—Md., Anne Arundel County, $1,000,000.
School—Pa., Munhall, $650,000.
Schools—Pa., Irwin, $250,000.

Bonds Defeated

Waterworks—O., Canton, $500,000.
Sewer Impvts.—O., Dayton, $100,000.

Constr. News page 212

Sewerage System—O., Warren, $980,000.
Sewers—Pa., McKeesport, $660,000.
Hospital—Mich., Flint, $195,000.
Hospital—O., Mansfield, $225,000.
School—O., Mansfield, $500,000.

FEDERAL GOVERNMENT

PROPOSED WORK

Calif., Alameda—AIRPORT—Dpt. Commerce, Aviation Div., preparing field, seawall, depot shops, drainage for air depot on site donated by city.

Calif., Richmond—TRAINING WALL—U. S. Eng., San Francisco, 99,000 tons rock extending training wall in Richmond Harbor.

Ia., Dubuque—POST OFFICE, etc.—Treas. Dpt. at office Sup. Archt., post office, court house. Site being purchased.

Mo., Kansas City—POST OFFICE—Treas. Dpt. at office Sup. Archt., 5 story, basement, 265 x 280 ft. post office. Bids Nov. 14 on excavation.

Nev., Las Vegas—DAM—Dpt. Interior, Bur. Reclamation, specifications for Hoover Dam Project (formerly Boulder) incl. dam, diversion tunnels, cofferdam, spillway, outlet works and power plant. Will be ready about Dec. 1 and call for bids issued at that time. Est. $108,-800,000.

N. Y., New York—POST OFFICE—Treas. Dpt. at office Sup. Archt., bids after Jan. 1, on foundations, superstructure, U. S. Post Office, 9th and 10th Aves. from 29th to 30th Sts.

Texas—DREDGING—U. S. Eng., Galveston, 8,830,000 cu.yd. Texas-Louisiana Waterway.

Tex., Brownsville — POST OFFICE — Treas. Dpt. at office Sup. Archt., 1 story, basement, 125 x 160 ft., post office. Project in abeyance. **Maturity about Feb. 1.** Noted Oct. 23.

Vt., Rutland—POST OFFICE—Treas. Dpt. at office Sup. Archt., bids in December, 2 story, basement, brick, stone, plain found. J. A. Wetmore, acting sup. archt.

BIDS ASKED

Ala., Montgomery—BARRACKS—Dec. 12, by Con. Q. M. Maxwell Field, one 163 man barracks at Maxwell Field; adv. E. N.-R. Nov. 20.

Ala., Montgomery—HEADQUARTERS—Dec. 12, at office Con. Q.M., Maxwell Field, headquarters, operations and parachute building at Maxwell Field; adv. E. N.-R. Oct. 20.

Arizona—ROAD—Dec. 2, by C. H. Sweetser, dist. engr. Pub. Rds., 508 Ellis Bldg., Phoenix, grading 2.818 mi. Oak Creek Natl. Forest Rd., Coconino Natl. Forest, Coconino Co.

Calif., March Field—HOSPITAL—Dec. 17, by Con. Q. M., field construction and completing addition to Air Corps Hospital.

D. C., Wash.—BOILER PLANT—Spec. 6297—Dec. 3, by Yards & Docks, Navy Dpt., boiler plant.

D. C., Wash. — SCHOOL — Jan. 6, by Con. Q. M., Army Medical Center, additions to Army Medical School; adv. E. N.-R. Nov. 20.

D. C., Wash.—STEEL DOORS, etc.—Dec. 5, by A. L. Flint, genl. purch. agt. Panama Canal, steel doors, steel windows, window operating devices, structural steel, galvenized corrugated metal roofing, and galvanized plain metal ridge roll, Schedule 2607.

Del., Wilmington—DREDGING—Nov. 26, by U. S. Eng. Office, 23,800 cu.yd. Wilmington Harbor; adv. E. N.-R. Nov. 20.

Ill., Moline — REMODELING — Dec. 9, by Treas. Dpt., at office Superv. Arct., remodeling, enlarging U. S. Post Office.

Louisiana—EARTHWORK—Nov. 25, by U. S. Eng., Vicksburg, Miss. 1,329,000 cu.yd. earthwork in Duckport New Levee, on west bank Mississippi River.

Miss., Kosciusko—POST OFFICE—Dec. 8, by Treas. Dpt. at office Superv. Archt., constructing U. S. Post Office.

Mo., Dover—DIKES—Dec. 1, by U. S. Eng. Postal Telegraph Bldg., Kansas City, 6,690 lin. ft standard pile clump dikes in Missouri River, at Berlin Bend, 0.9 mi. from here.

Mo., St. Louis—TURBO GENERATOR SETS—Dec. 10, by U. S. Eng., 428 Custom House, one 1,000 kw. and one 100 kw. turbo generator sets, one 1,000 hp. motor ready for installation on U. S. Dredge Fort Chartres. Noted Aug. 28.

Nev., Hawthorne—BUILDING, etc.—Yards & Docks, Navy Dpt., taking bids buildings, dugouts, railroad tracks, conveyor, and cableway systems, cranes and hoists, boiler plant, equipment, heating, plumbing, ventilating, light, power, telephone and alarm system, at Naval Ammunition Depot.

N. Y., Fort Slocum—BARRACKS—Dec. 12, by U. S. Eng., 39 Witehall St., New York, 2 company barracks with utilities; adv. E. N.-R. Nov. 20.

N. C., Kitty Hawk—MONUMENT—Dec. 18, by Con. Q. M., Room 2342, Munitions Bldg., constructing Wright Memorial, on Kill Devil Hill; adv. E. N.-R. Nov. 20. Noted Feb. 27.

Oregon—EARTHWORK—Spec. 515—Dec. 19, at office Bureau Reclamation, Vale, earthwork, structures, on Vale Main Canal, and Bully Creek East Bench Lateral System, Vale Project, near Vale. E. Mead, comr.; adv. E. N.-R. Nov. 20.

Oregon—NEEDLE VALVES—Spec. 516—Dec. 23, by Bureau Reclamation, Denver, Colo., three 48 in. internal differential needle valves, for Owyhee Dam, Owyhee Project. E. Mead, comr.; adv. E. N.-R. Nov. 20.

Pa., Phila.—REMODELING—Spec. 6285—Dec. 3, by Yards & Docks, Navy Dpt., remodeling building.

Tenn., Memphis—NURSES' HOME—Dec. 23 by Vet. Bu., Arlington Bldg., nurses home and main building additions.

Tex., El Paso — ELECTRIC AIRWAY BEACONS—Dec. 1, by Chief Clerk Dpt. Commerce, electric airway beacons on El Paso-Big Springs Sect. El Paso-Fort Worth Texas Airway.

Tex., Fort Sam Houston—QUARTERS—Dec. 12, at office Con. Q.M., 16 sets company officers quarters, 16 sets non-commissioned officers quarters; adv. E. N.-R. Nov. 20.

Va., Hampton Roads—TANK—Spec. 6170—Dec. 3, by Yards & Docks, Navy Dpt., steel tank, pump house addition.

Wash., Seattle—FEDERAL—Treas. Dpt. at office Sup. Archt., bid about Jan. 1, federal building, 1st and Marion Sts.

CONTRACTS AWARDED

Ariz., San Luis—INSPECTION STATION—Treas. Dpt. at office Sup. Archt., inspection station, to Anderson Bros., 500 North Cotton Ave., El Paso, Tex., $59,500. Noted Sept. 4.

D. C., Wash.—ADMINISTRATION—Vet. Bu., Arlington Bldg., administration building at U. S. Veteran's Hospital, to Murch Bros., 611 Olive St., St. Louis, Mo., $185,750. Noted Sept. 25.

Ill., Alton—DREDGING—U. S. Eng. Office, 428 Custom House, St. Louis, Mo., 60,000 cu.yd. place measurement in Alton Slough in Mississippi River, near here, to LaCrosse Dredging Co., 405 Plym. Bldg., Minneapolis, Minn., at $0.27 per cu.yd. Noted Nov. 6.

Mich., Selfridge Field — SEAWALL — Con. Q. M., seawall at Selfridge Field, to Culberson-Kelly Co., 2001 Washington Bl. Bldg., Detroit, $202,296. Noted Oct. 9.

Minn., Hastings — LOCKKEEPERS DWELLING—U. S. Eng., St. Paul, 2 lockkeepers dwellings, at Hastings Lock and Dam, to W. Murphy & Son, 1607 Pioneer Bldg., St. Paul, $99,789. Noted Sept. 18.

Mo., Excelsior Springs — QUARTERS — Vet. Bu., constructing, finishing Buildings 23 and 24, at U. S. Veteran's Hospital, to Morley Constr. Co., 1643 Belleview Ave., Kansas City, $56,370. Noted Sept. 4.

New York—RIP RAP JETTY—U. S. Eng., Army Bldg., Whitehall St., New York, 8,500 lin.ft. rip rap jetty at Rockaway Point, entrance to Jamaica Bay, to Merritt, Chapman & Scott, 17 Battery Pl., New York, $982,224. Noted Sept. 25.

Pa., Phila.—DREDGING—U. S. Eng., 80,800 cu.yd. Phila. Harbor, to United Dredging Co., 233 Bway., New York, $177,760. Noted Oct. 2.

R. I., Pawtucket — POST OFFICE — Treas. Dpt. at office Superv. Archt., U. S. Post Office, to Brooklyn & Queens Screen Mfg. Co., 17 Williams St., Brooklyn, N. Y., $153,000. Noted Oct. 9.

Tenn., Memphis—GRADER DERRICK BOAT—U. S. Eng., 1 steel hull grader derrick boat, to McClintic Marshall Co., Oliver Bldg., Pittsburgh, Pa., $29,500. Noted Sept. 11.

Tenn., Memphis — PILE DRIVERS — U. S. Eng., 2 steel hull pile drivers, to Nashville Bridge Co., foot Shelby Ave., Nashville, $55,136. Noted Sept. 11.

Utah, Ogden—POST OFFICE—Treas. Dpt. at office Superv. Archt., extending, remodeling U. S. Post Office, to J. F. Burke, Constr. Co., Kearns Bldg., Salt Lake City, $267,355. Noted Sept. 18.

RAILWAYS

PROPOSED WORK

Texas—Atchison, Topeka & Santa Fe Ry. Co., G. W. Harris, ch. engr. system, Chicago, Ill., granted permission by Interstate Commerce Comn. to construct 20 mi. line radiating from Spearman in southwest direction. $400,000. Private plans.

Texas—Texas & Pacific Northern Ry., subsidiary of Texas & Pacific Ry., E. F. Mitchell, Dallas, ch. engr., preliminary plans purchasing, laying 44,600 tons 85 lb. steel rails, 3,750 tons 56 lb. rails; constructing rein.-con., earth underpass, $25,000; steel bridge across Palo Duro Canyon, $270,000; rein.-con. culverts, $71,000; concrete, steel bridge over Tierra Blanca, $50,-000; constructing water stations, $250,000; roadway buildings, $350,000; railway and office stations, $490,000; machine and repair shops and engine house, $250,000, all foregoing to be constructed along route of new 333 mi. railroad. Noted Sept. 11.

Washington—Northern Pacific Ry., B. Blum, ch. engr., St. Paul, Minn., 59.44 mi. line from Moclips to point on north bank Hoh River, about 6 mi. northeasterly from Spruce. $5,836,-235. Noted May 2, 1929.

Ontario—Toronto, Hamilton & Buffalo Ry., R. L. Latham, ch. engr., James St., Hamilton, 5.5 mi. spur to plant of Canadian Aggregates Ltd., near Brantford. $150,000.

BIDS ASKED

Ontario—Nov. 25, by T. T. Irving, ch. engr. (Central Region) Canadian Natl. Ry., Union Station, Toronto, clearing, grading, constructing bridges on 5.8 mi. railway for cutoff in Brantford.

SUBWAYS AND TUNNELS

PROPOSED WORK

Ill., Chicago—Bd. Local Impvts., City Hall, M. J. Faherty, pres., State Street Subway. $43,000. H. F. Kelker, 20 North Wacker Dr., engr.

New York — Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, soon makes studies and test borings for vehicular tunnel from Battery Park, New York, to Hamilton Ave., Brooklyn. $50,000,000.

Ont., Windsor—Concrete, rein.-con. tunnel at Wyandotte St. $75,000. R. J. DesMarais, city engr.

CONTRACTS AWARDED

Ont., Sudbury—City substructure for subway under Canadian Pacific Ry. tracks at Eva St., to Duncan Constr. Co., Cochran-Dunlop Bldg. Est. $120,000. Noted July 31.

GRADE CROSSINGS

PROPOSED WORK

N. Y., Trenton—New York Central R.R. Co., F. B. Freeman, ch. engr., 466 Lexington Ave., New York, reconstructing bridge carrying tracks over Trenton-Prospect-Remsen State Ry. 61.-600.

Texas—See "Railways."

BIDS ASKED

Ala., Birmingham—Dec. 4, by City Comn., two 100 ft. underpasses under railroad tracks at 18th and 20th Sts., each to have concrete walls on both sides, 4 ft. thick, 12 ft. high in center, tapering off to almost nothing at either end, grading and 7 in. concrete paving under railway tracks of each. $360,000. City and Railroads, Birmingham, engrs.

CONTRACTS AWARDED

N. J., Perth Amboy—City Comn., underpass under New York Central and Pennsylvania R.R tracks, to A. Christensen, Perth Amboy, $45,900.

Pa., Bristol — Pennsylvania R.R. Co., T. J. Skillman, ch. engr., Broad St. Sta., Phila., grade elimination, to H. F. Curtis, 1270 Bway., New York. Est. $266,000.

DAMS

PROPOSED WORK

N. Y., Minerva—Bradley & LaBar, Glens Falls, dam creating artificial lake. C. J. Weaver, Waterford, engr.

BIDS ASKED

Kan., Topeka—Nov. 25, at office Governor, dam, incl. 270,000 cu.yd. earth fill, 6,250 sq.yd. rock rip-rap, 810 cu.yd. rein.-con. in Sects. 1 and 2, Twp. 11S, Route 20-E, Leavenworth Co. M. A. Wilson, ch. engr.

CONTRACTS AWARDED

Tex., Brownwood—See "Excavation, Drainage, Irrigation, Levees, River and Harbor."

PIERS AND WHARVES

PROPOSED WORK

Calif., San Francisco — PIERS — California State Board Harbor Comrs., Ferry Bldg., substructure for Pier 23, rein.-con. piles and deck. $450,000. F. G. White, Ferry Bldg., engr.

AIRPORTS

BIDS ASKED

N. Y., Brooklyn—Nov. 26, by M. Cosgrove, comr. Docks, Pier "A," Battery Pl., New York, steel sheet pile bulkhead, widening pier approach and repairing existing approach, removing and grading excess sand, constructing creosoted timber ramp, constructing beach incl. earth surfacing at Municipal Airport (Floyd Bennett Field), Flatbush Ave., Contr. 1999. Noted Feb. 13.

CONTRACTS AWARDED

N. Y., Brooklyn—M. Cosgrove, comr. Docks, erecting, installing enclosure for parking motor vehicles at Municipal Airport (Floyd Bennet Field), to Fleming-Shepard Co., 116 Broad St., New York, $19,160. Noted Oct. 30.

GRAIN ELEVATORS

PROPOSED WORK

Texas — GRAIN ELEVATOR — Oklahoma Wheat Growers Assn., c/o J. F. Triplett, Plainview, grain elevator at Kafir Switch between Tulia and Happy. **Maturity in 1931.**

BIDS ASKED

Mo., Kansas City—Missouri Pacific Ry. Co., E. A. Hadley, ch. engr., Missouri Pacific Bldg., St. Louis, bids about Jan. 2, 2,500,000 bu. grain elevator, rein.-con., incl. 126 storage bins, and 8 mi. service tracks, Topping Ave. $1,500,000. Continental Export Co., Merchants Exch. Bldg., St. Louis, lessee. E. M. Tucker, c/o owner, archt.

POWER AND LIGHTING

BIDS ASKED

N. Y., New York—Nov. 28, by E. P. Mulrooney, comr., Police Dpt., 240 Centre St., 104 traffic standards on 5th Ave.

Pa., Pittsburgh—"Waterworks."

CONTRACTS AWARDED

Calif., Glendale—City, furnishing 254 tubular steel standards with c.i. outer jackets to form combination trolley and lighting post for street lighting system, to Newberry Electric Corp., 726 South Olive St., Los Angeles, $93,546.

Calif., San Clemente — Griffith Co. (contractors), Railway Bldg., Los Angeles, sub-let ornamental street lighting system in connection with state hy. improvement between El Camino Real and Pacific Ocean, to J. R. Davies Co., 2131 Santee St., Los Angeles, for City, $36,367.

N. J., Elizabeth — Bd. Police Comrs., City Hall, installing traffic signals at 7 intersections, to Dengler, Liddy & Burd Co., 314-16 Morris Ave., $13,383. Est. $25,000.

SPORTS AND PARKS

PROPOSED WORK

Ill., Moline—City, c/o R. M. Berrell, city engr., plans by W. H. Schulzke, 830 5th Ave. Bldg., bath house, swimming pool in Prospect Park. $30,000.

Mass., Boston—City, Park Dpt., 33 Beacon St., J. J. Murphy, engr., public golf course, Stony Brook Reservation, Popular and West Sts., Hyde Park and West Roxbury. $25,000 or more.

Mass., Boston—City, Park Dpt., 33 Beacon St., public playground, North End Section, Foster Court, Foster Pl. and Goodrich Alley. $25,000. J. J. Murphy, 33 Beacon St., engr.

N. J., East Rutherford (mail Rutherford)—Bd. Educ., municipal playground on Key St., west of Riggen Field. $25,000. Engineer not selected.

N. Y., Beechhurst (mail Flushing)—Soundview Natatorium, J. Corrigan, pres., swimming pool, filter plant, Soundview Terrace. $40,000. Private plans.

N. Y., Flushing—Bd. Educ., 500 Park Ave., New York, athletic field, playgrounds at Flushing High School. To exceed $25,000. W. C. Martin, Flatbush Ave. extension and Concord St., Brooklyn, archt.

N. Y., Neponsit (mail Far Rockaway)—Dpt. Parks, W. R. Herrick, pres. Park Bd., Arsenal Bldg., Central Park, New York, bath pavilion, showers, locker rooms, restaurant Ocean Front and Washington Ave. at Jacob Riis Park. $425,000.

N. Y., New York—Beth Israel Hospital, 60 Jefferson St., bids in January, altering swimming pool, elevators, stairways, in 6 story hospital, 60 Jefferson St. $150,000. H. Hurwit, 41 West 33rd St., archt. Noted Oct. 2.

Tex., Dallas—City, c/o E. Goforth, clearing 210 acre tract, bridle paths, small concrete dam, playground apparatus, 3,900 ft. new road, 5 shelters, aboat house, 75,000 cu.yd. dredging, ornamental lighting for park development, Bachman Lake. $114,000, election soon for same.

BIDS ASKED

D. C. Washington—Dec. 8, by District Comrs., District Bldg., athletic field, incl. chain link fence, running track, sectional steel grandstands, sodding and seeding, for Western High School; adv. E. N.-R. Nov. 20.

New York,—Nov. 24, by W. C. Martin, archt. and supt. School Buildings, Flatbush Ave. extension and Concord St., Brooklyn, improving sites for playgrounds adjoining P. S. 37, Belknap St. and 136th Ave., Springfield; general contract, plumbing and drainage P. S. 85, 21st St. near 24th Ave., Long Island City; P. S. 122, Van Alst and Ditmars Ave., Long Island City, for Bd. Educ., 500 Park Ave., New York.

N. Y., Brooklyn—Nov. 25, by Park Bd. W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, New York, improving Carnarsie Park, west side East 93rd St. between Seaview and Skidmore Aves; cinder resurfacing east traffic road and screenings on bridle path, Ocean Parkway, from Coney Island Creek Bridge to Brighton Beach Ave.; improving Ocean Parkway, east traffic road from Avenue P to Avenue U; sheet asphalt on concrete repaving Grand Army Plaza at Prospect Park entrance; constructing playground at Marine Park, Gerrittsen Ave., between Everett Ave. and Bartlett Pl.; reconstructing Breeze Bridge in Prospect Park; hydraulic fill, Marine Park; sheet asphalt repairing roadway areas Shore Rd., Plaza St., Fort Hamilton and Bay Ridge Parkways.

N. Y., New York—Nov. 25, by Park Bd., W. R. Herrick, pres. Park Bd., Arsenal Bldg., Central Park, restoring lawns in Madison Square Park; 18 in. chain line fence with gates along and within boundaries Coleman Playground; asphaltic concrete paving roadway adjacent to sea wall and repairing sea wall along waterfront Battery Park.

Wis., Madison — Dec. 17, by Bd. Normal School, E. G. Doudna, secy., 100 x 170 ft. field house and 2 story, 60 x 225 ft. gymnasium, brick, tile, stone. $250,000. A. Peabody, Madison, engr.

CONTRACTS AWARDED

O., Youngstown—City, landscape construction for Forrest Lawn Memorial Park, to Freeland, McHale & Patton, Inc., 1 Penn Ave., Pittsburgh, Pa. Est. $150,000.

HEATING AND VENTILATING

PROPOSED WORK

N. Y., New York — Sacred Heart Convent, 130th St. and Convent Ave., revised plans heating, plumbing, electrical work for gymnasium. Former bids rejected. Maginnis & Walsh, Statler Bldg., Boston, Mass., archts. Noted Oct. 20 Daily.

BIDS ASKED

N. Y., Pine Aire Station—Dec. 17, by Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, heating, sanitary, and equipment for Kitchen Building 3, electric elevators Buildings 1, 2 and 3, refrigeration work Building 3, at Pilgrim State Hospital.

CONTRACTS AWARDED

N. J., Teaneck—Owner, c/o C. G. Mettburg, archt., 16 Depot Sq., Englewood, heating and plumbing for 1 story, basement, 125x150 ft. laundry, Front and Water Sts., to G. H. Frey, 30 West Harriet Ave., Palisades Park; refrigerating and sheet metal, to J. Laude & Son, Inc., 27 Mount Vernon St., Ridgefield Park. Noted Oct. 30 under "Factories and Mills."

N. Y., Syracuse—Bd. Contr. & Supply, City Hall, heating for Eastwood High School addition, to F. Brandt Co., 113 Oakwood Ave., $36,728; plumbing, to Pierce & Shaw, Syracuse, $20,648. Noted Nov. 13 under "Schools."

UNCLASSIFIED

PROPOSED WORK

Conn., Newtown—MEMORIAL—Town, World War Memorial. $25,000. Engineer not selected.

Fla., Tampa — FLOATING DRYDOCK — Tampa Shipbuilding & Eng. Co., South Water St., new floating drydock with construction and repair facilities. H. T. Donnelly, 247 Park Ave., New York, marine engr. **Maturity about Jan. 1.**

Mass., East Long Meadow—MEMORIAL—Town, J. R. Ford, chn., South Main St., soldiers' memorial. $25,000 or more. Engineer not selected.

Mass., Newton — LAND DEVELOPMENT — Hurley Bros., 30 Hurley Pl., Newton Centre, developing tract of land for building purposes, Boylston and Park, Newton Centre, incl. sewers, waterworks, street development. To exceed $25,000. Private plans.

Okla., Muskogee—NATURAL GAS SYSTEM —City defeated franchise election for natural gas distribution system to Oklahoma Natural Gas Co., 624 South Boston St., Tulsa. $1,500,000. Private plans.

Okla., Oklahoma City—GAS DISTRIBUTION SYSTEM—City franchise election natural gas distribution system, to J. G. Prundt, Ft. Worth, Tex. $4,000,000. M. Peshek, city clk.

Okla., Vinita—GAS SYSTEM—City, preliminary plans natural gas distribution system. $125,000. Russell & Axon, 6200 Easton Ave., St. Louis, Mo., and McDaniel Bldg., Springfield, Mo., engrs.

Texas and Nebraska—NATURAL GAS PIPE LINE—Western Natural Gas Corp., Public Utility Investment Co. Bldg., Salina, Kan., gas pipe line from Texas Panhandle fields to Omaha, Neb. Project in abeyance. Noted Nov. 13.

BIDS ASKED

Calif., San Francisco — PIER — Dec. 4, by State Bd. Harbor Comrs., Ferry Bldg., 150 x 800 ft. rein.-con. pier, green piles, concrete jacket and rein.-con. deck, Pier 23. F. G. White, Ferry Bldg., archt.

Delaware—GUARD RAIL—See "Streets and Roads."

N. Y., Creedmoor—TUNNELS—Nov. 26, by Commissioner Dpt. Mental Hygiene, State office Bldg., Albany, tunnels (service connections), heating, electrical work and altering existing kitchen building at Creedmoor Div., Brooklyn State Hospital.

N. Y., Marcy—TUNNELS—Dec. 10, by Dpt. Mental Hygiene, Capitol, Albany, general contract, heating, electrical work for service connections (tunnels), Utica State Hospital, Marcy Div.

N. Y., Middletown—REFRIGERATION—Dec. 17, by Dpt. Mental Hygiene, State Office Bldg., New York, refrigeration work for additions and alterations at Ashley Hall, Middletown State Homeopathic Hospital.

N. Y., New York—INSPECTION SHED, etc.—Dec. 5, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., inspection shed, service building, at Concourse Yard, Navy and Jerome Aves., West Bedford Park Blvd. and West 205th St.

N. Y., New York—FIREBOAT—Nov. 25, by J. J. Dorman, comr. Fire Dpt., Municipal Bldg., building, delivering steel gasoline-electric fireboat. Noted Oct. 24, 1929.

N. Y., New York—STATION FINISH, etc.—Nov. 25, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., station finish 174-175th St., Tremont Ave., 182nd-183rd St., and Fordham Rd. stations of Rapid Transit R.R.

N. Y., Ogdensburg—EXIT FACILITIES—Nov. 26, by Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, exit facilities and fire stops, New Ramp, Wards 32 and 33, Flower Building, St. Lawrence State Hospital. Noted Oct. 30.

N. Y., Ossining—GATES—Dec. 4, by Commissioner Dpt. Correction, State Office Bldg., Albany, constructing, electrical work for mechanical operation of gates, Sing Sing Prison; adv. E. N.-R. Nov. 20. Noted Nov. 6.

N. Y., Raybrook—ELECTRICAL WORK, etc.—Dec. 2, by Commissioner Dept. Mental Hygiene, State Office Bldg., Albany, constructing electrical work for replacement stairways in Pryor and McDonald Wings, remodeling rear entrance of main building and installing new lift, new stairs in East and West Wings, New York State Hospital for Treatment of Incipient Pulmonary Tuberculosis; adv. E. N.-R. Nov. 20.

Constr. News page 213

Unclassified (Continued)

CONTRACTS AWARDED

Colorado—GAS PIPE LINE—Colorado Interstate Gas Co., c/o F. J. Trelease, Colorado Springs, excavation and laying pipe line from Devine to Portland, to Southwestern Constr. Co., 302 South Cheyenne St., Tulsa, Okla. Est. $500,000.

Mass., Boston—WALL, etc.—Suffolk Co., J. A. Kelliher, sheriff, and City, wall, tunnel and guard house at Charles St. Jail, to F. Imhof Co., 164 Dudley St., Roxbury, $75,000. Noted Sept. 18.

N. Y., Wingdale—SERVICE CONNECTIONS—Dpt. Mental Hygiene, State Office Bldg., service connections for Harlem Valley Hospital, to Miller & Gaynor Co., Clinton Sq., Poughkeepsie, $15,232; heating, to H. Sand & Co., Inc., 158 Greene St., New York, $15,320; electrical work, to Langdon & Hughes Constr. Co., 246 Elizabeth St., Utica, $7,865. Grand total $38,417. Noted Nov. 5 Daily.

N. Y., Yorktown — PROTECTION WORK — Westchester Co. Park Comn., 72 West Pondfield Rd., Bronxville, structural steel, rein.-con. protection for Turkey Mountain Brook Syphon on Bronx Parkway extension, to A. Ciancuilli, 922 Nepperhan Ave., Yonkers, $19,870. Noted Oct. 23.

Ont., Fort William—PLUMBING, etc.—Bd. Educ., plumbing for technical school, to Carson & Burton, May and Cumming St.; wiring, to Mahon Electric Co., 113 Simpson St.; excavating to T. McCreanor, 138 Main St. S. Noted Nov. 13, under "Schools."

Ont., Toronto—SIGNAL TOWERS—Toronto Terminals Ry. Co., New Union Sta., 3 signal towers, to Redfern Constr. Co., 45 Front St. W. Est. $35,000.

MATERIALS

BIDS ASKED

GRAVEL—Eureka, Calif.—Dec. 2, by A. W. Kildale, city clk., 1,000 cu.yd. screened gravel.

SILICA BEARING ADMIXTURE — **Los Angeles, Calif.**—Bd. Supervs. Los Angeles Co. taking bids 600 tons silica bearing admixture for Big Tujunga Dam 1.

RAILS, etc.—**Chicago, Ill.**—Nov. 28, by City, Dpt. P. Wks., City Hall, 200 tons 30 lb. standard rail, 2,000 pairs standard splice bars, 8,000 track bolts, 10,000 steel cross ties, for Chicago Avenue Tunnel. R. W. Wolfe, comr.

LUMBER and PILING—**Osceola, Ia.**—Nov. 28, at office Auditor Clarke Co., 219,400 ft. standard sawed fir lumber, 3,500 lin.ft. red cedar and 3,240 lin.ft. creosoted piling.

LUMBER and PILING—**Columbia, Miss.**—Dec. 1, by Bd. Supervs. Columbia Co., 50,000 ft. creosoted lumber, 5,000 ft. creosoted piling, all treated with 15 lb. creosoted oil per ft.

BINDER STONE—**New York, N. Y.**—Nov. 24, by J. Miller, pres., Manhattan Boro, Municipal Bldg., 1,500 cu.yd. ¾ in. binder stone.

GASOLINE—**New York, N. Y.**—Nov. 24, by J. G. W. Greff, comr. Hospitals, Municipal Bldg., gasoline.

GASOLINE—**New York, N. Y.**—Nov. 26, by H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., 12,000 gal. gasoline.

CONTRACTS AWARDED

COPPER WIRE — **Los Angeles, Calif** — City Purchasing Agent, weatherproof insulated copper wire and bare copper wire, to Anaconda Wire & Cable Co. (Central Electric Supply Co.), 336 East 4th St., $39,707.

CAST IRON PIPE—**New Orleans, La.**—Sewerage & Water Bd., 526 Carondolet St., to National Cast Iron Pipe Co., Tarrant City, Birmingham, Ala., furnishing 1 car c.i. pipe, 12 ft. lengths, at $46.65 per ton, 15 pcs. 16 ft. long, $44.65, 112 ft. long to make up car, $43.65; to U. S. Pipe & Fdry. Co., American-Traders Natl. Bank Bldg., Birmingham, Ala., 1 car 12 ft. long, $46.75 per ton, 15 pcs. 16 ft. long, $44.75, 12 ft. long to make up car, $43.75.

PONTOON PIPE—**Detroit, Mich.**—Dpt. Parks & Boulevards, 735 Randolph St., 240 ft. pontoon pipe in 30 ft. lengths, 496 ft. short pipe in 16 ft. lengths, to James E. Degans Co., 2120 East Franklin St., $1,412. Noted Nov. 6.

POSTS—**Jersey City, N. J.**—State Hy. Dpt., State Office Bldg., Trenton, 250 long and 1,750 short c.i. posts, 1,100 c.i. post caps, to Duncan Mackenzie Sons Co., Inc., Fieldsboro, $10,691; 1,000 sq.yd. granite paving block and 378 ft. curb, to H. E. Fletcher, West Chelmsworth, $3,594; 42,800 gal. Grade "HK" asphaltic oil, to Warner Quinlan Co., 2 Park Ave., New York, $1,790. Grand total $19,075. Noted Oct. 23 Daily.

ASPHALT ROAD OIL—**New York, N. Y.**—H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., 100,000 gal. dust layer, to Warner Quinlan Co., 2 Park Ave., $3,270. Noted Oct. 30.

QUARRY ROCK—**Wisconsin**—State and La Crosse Co. Hy. Comns., La Crosse, furnishing, stockpiling 8,400 cords quarry rock, State Project 5291, Middle Ridge-La Crosse Rd., to Interstate Constr. Co., 615 Beaver Bldg., Madison, $52,437.

EQUIPMENT

PROPOSED WORK

TRACTOR—**Aitkin, Minn.**—City, C. Young, clk., bids probably in December, tractor.

Constr. News page 214

BIDS ASKED

BUCKET ELEVATOR—**Houston, Tex.**—Nov. 26 at office City Secretary, 1 bucket elevator and small screw conveyors to be used in connection with screening equipment at North Side Sewage Treatment Plant. W. E. Monteith, mayor.

FOREIGN

U. S. S. R., Magnelogorsky—Soviet Government (1st unit) coke plant to have 8 batteries of 69 coke ovens, incl. blast furnace in Southern Urals, here, to Koppers Constr. Co., Koppers Bldg., Pittsburgh, Pa.

Buildings

BUILDINGS—RESIDENTIAL

BIDS ASKED

N. J., Lakewood—Lakewood Milk Rest Cure, Inc., 154 Nassau St., New York, bids about February, general contract hotel, sanitarium, $150,000. H. Ginsberg, 205 East 42nd St., New York, archt. Noted Nov. 13.

N. Y., Brooklyn—See "Contracts Awarded."

Tenn., Union City—Union City Hotel Co., c/o E. K. Beck, et al., taking bids 5 story, 100 room, brick, concrete hotel, 1st St., $150,000. A. Hansen, Shrine Bldg., Memphis, Archt. Noted Oct. 2.

Pa., Beachwood—See "Contracts Awarded."

Vt., Burlington—W. S. Appleyard taking bids 7 story, 100 x 150 ft., brick, steel, Summit St., $300,000. G. N. Meserve, 260 Tremont St., Boston, Mass., archts. Noted Oct. 23.

Wis., Milwaukee—Nov. 25, by G. Zagel & Bros., archts., 144 East Wells St., 8 story, basement, 50 x 125 ft., brick, steel, Wisconsin St., for Croston Investment Co., c/o architects.

Wis., Milwaukee—Nov. 26, by H. L. Kuehnel, engr., 4625 Woodlawn Court, 3 story, basement, 54 x 108 ft., brick, concrete, 19th St., for owner, c/o engineer.

CONTRACTS AWARDED

Mass., Roxbury (sta. Boston) — New York Life Insurance Co., S. J. Hooper, agt., 209 Washington St., 3 story, basement, 55 x 150 ft., brick, stone, steel apartment, plain found., 188 Humboldt Ave., to J. M. and C. J. Buckley Co., 183 Essex St., Boston. Est. $150,000.

N. J., Newark — Prudential Life Insurance Co., Prudential Bldg., general contract six 5 and 6 story, basement, brick, steel, to R. A. Houie, Jr., 763 Broad St. Est. $1,000,000. Noted Oct. 30.

N. Y., Brooklyn—Asher Dann & Sons, 6115 5th Ave., 6 story, 90 x 100 ft., East 37th St. and Church Ave., separate contracts, $185,000. S. L. Malkind, 93 Court St., archt.

N. Y., Brooklyn—Cameo Constr. Co., 1465 East 45th St., 2 story, basement, Avenue K and East 48th St., day labor and separate contracts. $150,000. I. Kallich, 26 Court St., archt.

N. Y., Brooklyn—Five Hundred Fifty Ocean Avenue Corp., J. Perlbinder, pres., 332 East 149th St., New York, 6 story, 96 x 117 ft., Ocean Ave. and Church St., separate contracts, $200,000. Franklin, Bates & Heindsmann, 2526 Webster Ave., archts.

N. Y., Brooklyn—G. and G. Building Corp., S. Goldberg, pres., 66 Court St., 6 story, 80 x 82 ft., brick, steel, 64th St. and East Bay Parkway, separate contracts. $150,000. M. Hirsch, 350 Stone Ave., archt.

N. Y., Brooklyn—Lamont Holding Corp., J. Segal, pres., 80 Linden Blvd., 6 story, 96 x 111 ft., Lefferts Ave. and Lamont Court, separate contracts. $150,000. Cohn Bros., 361 Stone Ave., archts.

N. Y., Brooklyn—Malhen Realty Corp., 2015 Foster Ave., 6 story, 63 x 108 ft., Cortelyou Rd. and East 19th St., separate contracts, $200,000. W. T. McCarthy, 147 Pierrepont St., archt.

N. Y., Brooklyn—N. Sokolous, 4210 Church Ave., 6 story, 85 x 90 ft., Empire Blvd. and Troy Ave., to Le So Builders, Inc., 4210 Church Ave. Est. $150,000.

N. Y., Brooklyn—Trynin Sons, Inc., M. Goldberg, pres., 220 Ocean Parkway, 6 story, 104 x 131 ft., St. Johns Pl. and Brooklyn Ave., separate contracts. $275,000. Ricca & Ungarleider, 186 Remsen St., archts.

N. Y., New York—Corporation, c/o H. S. Hillyer & Co. and S. L. Adler, 10 5th Ave., co-operative apartments, Washington Sq. and 5th Ave. $3,000,000. **Maturity in December.** Work may be done by separate contracts or awarded without competition to Thompson Starrett Co., 250 Park Ave. Noted Oct. 30.

N. Y., New York—Mitchel Place Realty Co., c/o Bien & Prince, archts., 415 Lexington Ave., 17 story, 100 x 100 ft., Beekman and Mitchell Pls., to Lane Ogle, Inc., Pier 3, North River. Est. exceeds $1,000,000. Contractor now taking bids on separate contracts.

N. Y., New York—Two Fifth Avenue Corp., 10 5th Ave., apartment, West 8th St. and 5th Ave. $5,000,000. Owner will either build by separate contracts or let without competition. **Maturity in December.** Walker & Gillette, 599 Madison Ave., archt. Noted Oct. 30.

Pa., Beachwood—L. J. Harris, 114 Audubon St., Wayne, 6 story, basement, irregular sized brick, steel, plain found., separate contracts $225,000. Heacock & Kenson, 1211 Chestnut St., Phila., archts.

Pa., Highland Park (mail Phila.)—Lynn Apartment Co., c/o C. F. Schaef, archt., 11 South 16th St., Phila., 4 story, basement, 87 x 124 ft., brick, steel, plain found., Lynn and Merion Aves., to Stewart Bros., 3509 North 10th St., Phila. Est. $250,000.

CLUBS

PROPOSED WORK

N. J., Jersey City—J. F. Jackson, archt., 137 East 45th St., New York, bids about March, general contract on revised plans 7 story, basement, brick, steel, Fairview and Bergen Aves., for Y. M. C. A., S. H. Lipscomb, genl. secy., 654 Bergen Ave. $300,000. Noted Oct. 30.

N. J., Preakness—Owner, c/o F. W. Wentworth, archt., 140 Market St., Paterson, 2 story, basement, brick, timber golf club, $150,000.

Wash., Seattle — Bd. Directors Y. M. C. A., University Seattle, plans by A. M. Allen, Lbr. Exch. Bldg., and bids about Jan. 1, club, 12th N. E. and East 50th Sts. $200,000.

Que., Aylmer—Royal Ottawa Golf Club, C. H. McLaren, pres., new club house. $200,000.

BIDS ASKED

O., Cleveland — Nov. 21, by C. R. Greco, archt., Guardian Bldg., 1 and 2 story club house addition, for Oakwood Club, J. M. Berne, pres., 1520 Warrensville Center Rd. $150,000. Noted Oct. 16.

HOSPITALS

PROPOSED WORK

Conn., Meriden—State, State School for Boys, R. L. McLaughlin, supt., hospital and administration building, dormitory, staff buildings, all brick, steel. To exceed $150,000. Architect not selected.

Ill., Chicago—Comrs. Cook Co., County Bldg., sketches by E. E. Hall, 123 West Madison St., 17 story nurses home, Lincoln and Polk Sts. $2,350,000.

Ill., Danville—Lake View Hospital Assn., 812 North Logan Ave., C. Baum, secy., sketches by Liese & Ludwick, Temple Bldg., Morrison Memorial Addition to hospital, 4 story, basement, brick, stone, Logan Ave. $200,000.

Mass., Boston—Owner, c/o H. L. Meacham, archt., 120 Front St., Worcester, 2 story, basement, 95 x 125 ft., brick hospital. $160,000. Noted Feb. 20.

Mass., Roxbury (sta. Boston) — House of Good Samaritan, A. Cunningham, pres. Bd. Trustees, 100 Arlington St., sketches by Andrews, Jones, Biscoe & Whitmore, 50 Congress St., Boston, 2 story, basement, brick, stone hospital wing, Binney St. $150,000 funds being raised for same.

Mich., Detroit—S. C. McArthur, Northwestern Hospital, 9222 Grand River Ave., 4 story, basement, brick, steel, hospital, plain found., Elmhurst Ave. $500,000.

N. H., Littleton — M. M. Eaton, pres. Bd. Trustees, Littleton Hospital, plans by Rich, Mathesius & Koyl, 320 5th Ave., New York, and soon takes bids altering and constructing hospital addition. $150,000. C. F. Neergard, 512 5th Ave., New York, consultant. Noted Aug. 15.

N. J., New Brunswick—Maginnis & Walsh, archts., 100 Boylston St., Boston Mass., soon lets contract completing 5 story, basement, 45 x 110 ft., brick, steel, hospital and new 5 story wing, Easton Ave., for St. Peters General Hospital, Easton Ave. $150,000.

N. Y., New York—Mount Sinai Hospital, 1 East 100th St., plans by Gehron & Ross, 101 Park Ave., altering and constructing addition to nurses' training school, 100th St. $175,000.

O., Cleveland—City, D. S. Blossom, dir. Pub. Welfare, plans by H. Kregelius, City Hall, 2 story, basement, brick, steel, concrete addition to tuberculosis sanitarium, Warrensville Farm, $600,000 voted for same; sketches by same architect 2 story, basement, brick, steel, concrete addition to sanitarium, Scranton Rd., $650,000 voted for same. Noted July 31.

O., Massillon — State, Columbus, plans by State Architect, State Architect's Office, Columbus, rebuilding 3 story basement brick dormitory recently destroyed by fire, at part of State Hospital for Insane administration building, to house small movie theatre for patients, south of here. $200,000.

Tex., Dallas—Texas Children's Hospital, 806 Jackson St., sketches by De Witt & Washburn, 1229 Kirby Bldg., hospital, Maple and Welborn Sts. $250,000.

Pa., Pittsburgh—Pittsburgh Eye & Ear Hospital, 1945 5th Ave., bids late in April, general contract, hospital. To exceed $150,000. E. P. Mellon, 350 Madison Ave., New York, archt. Noted Apr. 25 1929.

BIDS ASKED

N. Y., New York—Dpt. Hospitals, Municipal Bldg., bids about Jan. 1, 7 story, 196 x 238 ft. woman's pavilion, at Harlem Hospital, 22-44 West 137th St. $1,550,000. Sloan & Robertson, 420 Lexington Ave., archts. Noted Jan. 30.

Hospitals (Continued)

CONTRACTS AWARDED

Calif., Agnew — State Dpt. P. Wks., Sacramento, general contract 1 story ward, kitchen and steam plant, rein.-con., plain found., to J. F. Shepherd, 1st Natl. Bank Bldg., Stockton, $207,961; plumbing and heating, to Hately & Hately, 1710 10th St., Sacramento. $41,880. Noted Oct. 23.

Mass., Northampton — Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, hospital ward unit, to Northampton Constr. Co., 6 Greeley Ave., Florence, $121,274; heating and ventilating, also plumbing, to R. E. Davies & Son, 12 Market St., Northampton, $25,695 and $10,702 respectively; electrical work, to Interstate Electric Constr. Co., 26 Taylor St., Springfield, $6,612. Grand total $164,283. Rejected bids superintendent's cottages. Noted Oct. 30.

Mass., Springfield—Springfield Hospital, 759 Chestnut St., altering and constructing 7 story, basement, and 2 story, basement, brick, limestone, steel hospital addition and service building, plain founds., to F. T. Ley & Co., Inc., 1215 Main St. Est. $1,000,000. Noted Oct. 2.

N. Y., Brooklyn—Dpt. Hospital, J. G. W. Greeff, comr., Municipal Bldg., New York, general contract isolation pavilion for Kingston Ave., Hospital, to J. Weinstein Building Corp., 66 Court St., $203,973; nurses home, to Hudson Contg., 1265 Bway., New York, $298,000. Noted July 31.

N. Y., Kings Park—Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, general contract assembly hall at Kings Park State Hospital, to Prahl Constr. Corp., 420 Lexington Ave., New York, $101,000; heating, to I. Williner, Inc., 500 West 167th St., New York, $13,219; sanitary work, to Halloran, Inc., 261 West 126th St., New York, $3,775; electrical work, to Tucker Electric Co., 241 East 15th St., New York, $7,181. Grand total $125,175. Noted Sept. 25.

N. Y., Troy—Samaritan Hospital, general contract 2 story, basement, 70x130 ft. dormitory, Peoples Ave., to C. F. Crowley Constr. Co., Troy, $160,000.

CHURCHES

PROPOSED WORK

Conn., New Britain — St. John's German Evangelical Lutheran Church, M. Gaudeau, 295 Arch St., pastor, plans by F. C. Teich, 99 Main St., church and community house, 301 Arch St. $150,000 or more. Noted Dec. 19.

Mass., Barnstable—Federal Church Society, C. E. Harris, chn. Building Comn., Hyannis, church, Main St. $150,000-$175,000. Architect not selected.

Minn., Minneapolis — St. Peter's African Methodist Episcopal Church, A. T. Reading, pastor, 3828 5th Ave. S., plans by Bard & Vanderbilt, 1016 Builders Exch., brick, stone, 38th St. and 5th Ave. S. $150,000.

N. J., New Brunswick — Christ Episcopal Church, W. H. Stone, pastor, 216 Lawrence St., plans by P. L. Fowler, 224 East Hanover St., Trenton, 2 story, basement, brick, steel rectory, plain found., College Ave. between Richardson and Huntington Sts. $150,000. Noted Nov. 13.

N. J., Perth Amboy—St. Michaels Church, c/o G. W. Brooks, archt., 216 Smith St., 2 story, basement, brick, steel, Hull Ave. Work now going ahead, formerly in abeyance. Noted Oct. 9.

BIDS ASKED

Mass., South Byfield—South Byfield Methodist Church, J. F. Scott, pastor, taking bids rebuilding 1 story, basement, brick, stone, recently destroyed by fire, plain found. $150,000. Derby, Barnes & Champney, 3 Joy St., Boston, archts. Noted Sept. 11.

N. J., Darlington—Myers & Shanley, archts., 24 Walnut St., Newark, bids about Jan. 15, general contract 2 story, basement, brick, steel seminary, for Immaculate Conception Seminary, c/o architects. $150,000. Noted Sept. 4 under "Arlington."

N. J., Dunnellen—See "Contracts Awarded."

CONTRACTS AWARDED

Ill., Oak Park—J. W. McCarthy & Co., archts., 139 North Clark St., general contract stone church, to W. J. Lynch & Co., 844 Rush St., for St. Catherine of Sienna Parish, Catholic Bishop of Chicago, 719 Cass St. Est. $150,000. Noted Oct. 1.

N. J., Dunellen — Holy Innocents Episcopal Church, C. A. Conover, in charge, 334 4th St., 2 story, basement, brick, steel parish house, plain found. $150,000. H. Day, 300 Vail Ave., archt., builds by separate contracts. Noted Oct. 9.

N. Y., New York—Eleventh Church of Christ Scientist, c/o A. Pencile, 2382 Grand Concourse, church, Grand Concourse and 190th St., to J. W. Ferguson, 420 Lexington Ave. Est. $150,000.

Ont., Windsor — St. Claire's Church, E. G. Doe, pastor, Tecumseh Rd., general contract brick, stone, steel, rein.-con., to B. Blonde Cornhill St., Chatham; plumbing, heating, ventilating, stoker and ventilating to J. E. Hussey, 645 Lincoln Rd. Est. $100,000. Noted Sept. 25.

SCHOOLS

PROPOSED WORK

Calif., San Francisco — City and San Francisco Co., S. J. Hester, secy. Bd. P. Wks., fireproof school addition, Mission and Lowel Sts. $150,000. Architect not selected.

Calif., Santa Barbara—Santa Barbara Union High School Dist., plans by W. H. Weeks, 111 Sutter St., San Francisco, High School, 2 story, basement, rein.-con., terra cotta high school. $650,000.

Conn., Stonington — State of Connecticut, Mystic Iral School for Deaf, sketches by Payne & Keefe, 231 State St., New London, school and teachers living quarters. $200,000.

Conn., Waterbury — City, Bd. Educ., brick, steel school, Woodland and Homestead Aves. $150,000. Architect not selected.

Ill., Evanston—Northwestern University bids in January general contract library. To exceed $150,000. James Gamble Rogers, 154 East 46th St., New York, archt. Noted June 26.

Ill., Rock Island—Augustana University, G. Andreen, pres., plans by Cervin & Stuhr, Safety Bldg., Science Hall, 3 story, basement, brick, limestone. $200,000.

Mass., Beverly—Beverly School for Deaf, D. L. Pickman, Bd. Trustees, 50 State St., Boston, 2 story, basement school, Echo Ave. $160,000. Architect not selected.

Mass., Boston—Katherine Gibbs School, K. Gibbs, dir., 90 Marlboro St., sketches school and dormitory additions, Dartmouth St. $150,000. Private plans.

Mass., Newton—City, S. Weeks, mayor, altering and constructing school addition, Arlington St. $150,000 or more. Architect not selected.

Mass., Spencer — Town, Superintendent of Schools, high school addition. $150,000. Architect not selected.

N. J., Hasbrouck Heights—Bd. Educ., Administration Bldg., Junior and Senior High School, 2 story, basement, brick, steel. $150,000 or more. **Maturity probably soon.** Architect not selected.

N. J., Woodbridge—Bd. Educ., Barron Ave., 2 story, basement, brick, steel addition to School 11, Ross St. $150,000. Architect not selected.

N. Y., Brooklyn—Bd. Educ., 500 Park Ave., New York, plans by W. C. Martin, Flatbush Ave. extension and Concord St., school, Avenue U, East 63rd and 64th Sts. To exceed $150,000.

N. Y., College Point—Bd. Educ., 500 Park Ave., New York, plans by W. C. Martin, Flatbush Avenue extension and Concord St., Brooklyn, school, 7th Ave. and 128th St. $415,000.

N. Y., Manlius—School Bd., R. M. Balantyne, pres., altering and constructing addition to high school. $265,000 bond issue approved.

N. Y., Worcester—Bd. Educ. plans by H. O. Fullerton, National City Bldg., Cleveland, O., Central School, 2 story, basement, brick, steel, concrete, $150,000.

N. Y., South Glens Falls (mail Glens Falls) —Bd. Educ. 2 story, basement, brick, concrete, stone high school, concrete found., Architect not selected.

R. I., North Scituate—Town of Scituate, B. D. Fish, chm., comn., sketches by Monahan & Meikle, 255 Main St., Pawtucket, altering and constructing 2 story, basement, brick school. $150,000.

R. I., Providence—Brown University, C. A. Barbour, pres., plans by Howe & Church, Turks Head Bldg., and soon takes bids altering and constructing 3 story, basement, brick, steel addition to Faunce Hall, plain found., at Brown University. $150,000 or more. Noted Oct. 2.

Tex., Galveston—Bd. Educ., c/o J. W. Neethe, schools. $2,000,000.

Vt., Burlington—City, School Bd., school Williams and Pearl Sts. $200,000. Architect not selected.

BDS ASKED

Calif., San Francisco—Dec. 3, by S. J. Hester, secy. Bd. P. Wks., City Hall, Junior High School, 2 story, rein.-con., general contract $418,000, structural steel $21,000, mechanical equipment $45,000, plumbing $29,000, electrical work $28,000, for City and Los Angeles Co. W. H. Crim, Jr., 488 Pine St., archt. Noted Oct. 23.

Calif., San Jose—Dec. 2, by G. B. Dougall, state archt., Pub. Works Bldg., Sacramento, 1 and part 2 story, 38,500 sq.ft. floor space, rein.-con., brick mens gymnasium with veneer base, plain found., for San Jose State Teachers College. $130,000. Former bids rejected. Noted Aug. 28 under "Contracts Awarded."

Del., Wilmington — Dec. 2, by Mary and William School, Delaware School Foundation, Du Pont Bldg., Wilmington, general contract 2 story, basement, brick, steel, rein.-con., plain found. $400,000. Guilbert & Betelle, 20 Branford Pl., Newark, N. J., archts.

D. C., Wash.—Dec. 5, by District Comrs., District Bldg., school, Northampton St. and Broad Branch Rd.

D. C., Wash.—Dec. 3, by District Comrs., District Bldg., Horace Mann School, 8 rooms.

Mich., Detroit—Nov. 26, by C. A. Gadd, bus. mgr. Bd. Educ., 2 story, basement, brick, steel, rein.-con., plain found., State Fair Ave. $160,000. McGrath & Dohmen, 2231 Park Ave., archts.

N. J., Linden—Bd. Educ., St. George Ave., bids about Dec. 15, 2 story, basement, brick, steel, rein.-con. addition to Senior High School, St. George Ave. $380,000. H. B. Brady, Inc., 333 North Broad St., Elizabeth, archts.

N. J., Port Colden — Dec. 3, by Bd. Educ., Washington Twp., F. K. Rudell, clk., general contract 1 story, basement, 70 x 120 ft., brick, steel consolidated school. $150,000. Jacoby & Everett, Commonwealth Bldg., Allentown, Pa., archts. Noted Oct. 9.

N. Y., Cold Spring—Bd. Educ., Dist. 13, bids about Jan. 1, general contract school. $250,000. Knappe & Morris, 171 Madison Ave., New York, archts. Noted Oct. 2.

N. Y., Syracuse—Dec. 23, by Commissioner Dpt. Educ., Education Bldg., Albany, general contract Forestry Science Building, at New York State College of Forestry, Syracuse University.

N. Y., New York—Nov. 25, by W. C. Martin, archt. and supt. School Buildings, Flatbush Ave and Concord St., Brooklyn, constructing P. S. 103, East 229th St. from Bronx Blvd. to Carpenter Ave., for Bd. Educ., 500 Park Ave.

O., Columbus—Nov. 28, by C. E. Steeb, secy. Bd. Trustees Ohio State University, 3 story, 47 x 60 ft., brick, concrete, stone addition to botany and zoology building. $150,000. C. H. Chubb, Ohio State University, archt. Noted Aug. 15.

Tex., San Antonio—Society of Mary, c/o J. Waldron, 112 Pine St., or 3023 Cote Brilliante Ave., St. Louis, Mo., taking bids foundations for school, administration and gymnasium buildings, North St. Mary's St. Total est. $600,000. H. Dresiocerner, 3824 Arsenal St., and c/o Society of St. Mary, St. Louis, Mo., archt. Lilly & Drought, Smith-Young Tower Bldg., engrs. Noted Oct. 23.

Wis., Madison — Dec. 10, by Bd. Regents University of Wisconsin, M. E. McCaffrey, secy., 3 story, basement, 40 x 125 ft. infirmary, and 3 story addition to horticultural building. A. Peabody, Madison, archt.

Ont., Toronto—Nov. 25, by W. W. Pearse, bus. administrator and secy.-treas., masonry, plain and rein.-con., cut stone, and bar joist construction, carpentry, structrual steel, ornamental iron, lathing and plastering, roofing and sheet metal work, terrazzo and marble, painting and glazing, kalamein iron work, local phones, electric wiring, heating, plumbing, ventilation, pipe covering for Withrow Ave. School.

CONTRACTS AWARDED

Conn., Middletown—City, Bd. Educ., 2 story, basement, brick, steel high school addition, to J. H. Mylchreest, 50 Brainerd Ave., $155,450. Noted Oct. 23.

Conn., West Haven (br. New Haven)—Town, W. Cox, pres. School Bd., altering and constructing 2 story, basement, brick addition to Forest Grade School. $150,000. Architect not selected.

Ill., Chicago—Bd. Educ., 188 West Randolph St., E. Withall, bus. mgr., carpentry contract for W. D. Smyser Elementary School, to M. E. Barquist, 1824 East 79th St., $41,959; steel erection, to Fransden Constr. Co., 64 West Randolph St., $8,375; painting, to Davis & Kreeger, 211 West 63rd St., $12,621; plastering, to Goss & Guise, 228 North La Salle St., $22,000; steam heating, to A. Kilander & Co., 126 South Clinton Ave., $40,546; heating, to Barber Colman Co., 549 West Washington St., $2,475; ventilating, to Rud Wiersig Co., Inc., 2311 North California Ave., $23,970; electrical work, to Stinmetz Electric Co., 800 North Clark St., $19,740; miscellaneous iron, to General Bronze Co., 228 North La Salle St., $5,790. Grand total $177,476. Noted Nov. 6.

Ind., Hammond—School Comrs., general contract 2 story, basement, 215 x 325 ft., rein.-con., brick, hollow tile, incl. auditorium, gymnasium, to C. Hansen, 604 State Line Ave., Calumet City, Ill.; heating and ventilating, to J. H. Salyer, Hammond; electrical work, to Seliger Electric Co., Whiting. Est. $500,000. Noted July 10.

Mass., Hyde Park—City of Boston, Dpt. School Buildings, 11 Beacon St., 2 story, basement, brick, stone, Elihu Greenwood Dist., plain found., to John Bowen Co., Inc., 129 Newbury St., Boston, $167,700. Noted Oct. 30.

Minn., Minneapolis—Bd. Educ., 305 City Hall, general contract 3 story, basement, brick, steel, stone, rein.-con., to Pike & Cook, 416 South 5th St., $369,800. Noted Oct. 23.

Mo., St. Joseph—Bd. Educ., A. L. Loving, secy., general contract Hyde Grade School, 2 story, basement, 96 x 177 ft., rein.-con., brick, to Lawhon Constr. Co., 505 Main St., $106,146; heating and plumbing, to Turner & Cook, 1201 Frederick Ave., $19,660 electrical work, to H. C. Korns Electric Co., 1725 Frederick Ave., $2,990. Grand total $128,796.

N. J., Hillside (br. Elizabeth) — Bd. Educ., Central Grammar School, general contract 2 story, basement, brick, steel, to Schurman Constr. Co., 86 Lexington Ave., Passaic, $123,000; plumbing, to Jaehnig & Peoples, Inc., 221 13th Ave., Newark; $7,911 heating, to Burnes, Lane & Richardson Co., 1107 Broad St., Newark, $22,145; electrical work, to Friedman Bros., 41 Rose Terrace, Newark, $6,700. Grand total $159,756. Noted Nov. 6.

N. Y., Genesco — Commissioner Dpt. Educ., State Office Bldg., Albany, general contract practice school at New York State Normal School, to H. J. Conrath, Erie, Pa., $299,200. Former contract rescinded. Noted Nov. 6.

Tenn., Cookeville—State of Tennessee, Dpt. Educ., War Memorial Bldg., Nashville, to Foster & Creighton Co., 4th and 1st Natl. Bank Bldg., Nashville, Home Economics Building, 3 story, basement, $185,000; dormitory, $145,000; Industrial Arts Building, 3 story, basement, $185,000. Grand total $515,000. Noted Oct. 23.

Tenn., Murfreesboro—State of Tennessee, Dpt. Educ., Nashville, 3 story, colonial brick, stone, Georgian style architecture science building, to V. L. Nicholson, 102 West Church St., Knoxville, and 804 Church St., Nashville, $185,000. Noted Oct. 23.

Constr. News page 215

Schools (Continued)

Wis., Beloit—Beloit College, structural steel for college addition, to Milwaukee Bridge Co., 1410 34th St., Milwaukee; reinforcing steel, to Concrete Steel Co., 425 East Water St., Milwaukee, millwork, to Corr, Ryder & Odoms Co., Dubuque, Ia., cut stone, to J. O'Connor Stone Co., Racine. Noted Nov. 13, under "Contracts Awarded."

Wis., Wausau—Bd. Educ., general contract 2 story, 109 x 157 ft., brick, tile school, to H. Dern, Wausau; plumbing to Central, Plumbing & Heating Co., Wausau; wiring, to Rilling Electric Co., Wausau.

THEATRES

PROPOSED WORK

Calif., Sacramento—Warner Bros., Inc., 1708 Talmadge St., Los Angeles, plans by B. M. Pretica, Warner Brothers Down Town Theatre Bldg., rein.-con. steel theatre, 10th and L Sts. $750,000.

Ill., Chicago—See "Contracts Awarded."

Mass., Boston — Paramount-Publix Corp., Paramount Bldg., New York, sketches by A. H. Bowditch, 44 Bromfield St., theatre, Adams House Site, Washington St. $150,000 or more.

R. I., Warren — Assoc. Theatres of Rhode Island, A. Romano, 368 Westminster St., Providence, 1 and 2 story, basement, brick, steel theatre, stores. $150,000. Architect not selected.

Wash., Kelso—W. E. Buell, Portland, Ore. and C. Keeler, Kelso, plans by C. F. Mahon, New Orpheum Bldg., Seattle, 7 story, basement, theatre, hotel. $250,000.

CONTRACTS AWARDED

Ill., Chicago—Publix-Balaban & Katz Corp., 175 North State St., foundation contract, rein.-con., brick, steel theatre, 4,000 seating capacity, to Paschen Bros., 33 North La Salle St.; structural steel, to Gage Structural Steel Co., 3141 South Hoyne Ave; steel erection, to Overland Constr. Co., 205 West Wacker Dr. Owner, soon takes bids on superstructure and mechanical trades. Est. $1,500,000. Noted Oct. 1.

BANKS

PROPOSED WORK

Calif., Chico—Bank of Italy, Bank of Italy Bldg., San Francisco, plans by H. A. Minton, Bank of Italy Bldg., San Francisco, 1 story, basement, rein.-con., bank, office, Bway. and 2nd Sts. $150,000.

Conn., Wallingford — Wallingford Bank & Trust Co., J. Martin, pres., plans by Harper & West, 92 State St., Boston, Mass., and soon takes bids altering 1 story basement, brick, concrete, steel, 28034 Center St. $200,000. Noted Aug. 7.

Mass., Winchester — Winchester Co-operative Bank, J. Challis, pres., bids after Nov. 24, 1 story, basement, irregular sized, brick, limestone, rein.-con., granite, steel, concrete found., Vine St. $150,000 or more. E. R. Wait, Lawson Rd. extension, archt. Noted Oct. 30.

Va., Richmond—Morris Plan Bank, P. Wollcott, Sr., vice-pres., plans by Lee, Smith & Vandervort, Inc., 6th and Franklin Sts., bank, 8th and Main Sts. To exceed $500,000. Noted Oct. 30.

BIDS ASKED

Wash., Spokane—Dec. 5, by Spokane & Eastern Trust Co., J. L. Campbell, secy., 8 story, basement, 60 x 100 ft., reni.-con., brick, terra cotta bank, office, Howard and Riverside Sts. $500,000. A. Moorman & Co., 813 1st Natl.-Soo Line Bldg., Minneapolis, Minn., archt. Noted Oct. 23.

CONTRACTS AWARDED

Mass., Foxboro — Foxboro National Bank, E. H. Bristol, pres., 2 School St., 1 story, basement, irregular sized, brick, limestone, concrete steel, plain found., to Central Eng. & Constr. Co., 210 Main St., Pawtucket, R. I. Est. $150,000. Noted Oct. 30.

Okla., Chickasha — Citizens Natl. Bank, 2 story, basement, 50 x 140 ft., to St. Louis Bank Equipment Co., 900 Sidney St., St. Louis, Mo. Est. $150,000.

OFFICES

PROPOSED WORK

Ga., Atlanta—Southern States Insurance Co., Candler Bldg., 2 story top addition to present 6 story office, change theatre part into stores, rebuild elevator shafts. A. Ten Eyck Brown, Forsythe Bldg., archt.

Ill., Chicago—E. H. Siebel, 214 West Ohio St., sketches by Granger & Bollenbacher, 333 North Michigan Ave., 17 story, 46x100 ft., Michigan Ave. and Ontario St. $3,000,000. **Maturity late 1931.**

N. Y., New York — Corporation, c/o W. Ahlschlager, archt., 65 East Huron St., Chicago, Ill., or W. S. Sussman, 295 Madison Ave., bids about January, general contract 24 story office, 6th Ave. and 41st St. $2,000,000. Noted Oct. 30.

Wash., Seattle—Insurance Building Corp., W. E. Johnson, pres., 13 story office addition, incl. auditorium, 2nd Ave. and Madison St. $1,000,000. Albertson, Wilson & Richardson, Henry Bldg., archts.

BIDS ASKED

Ia., Sioux City—See "Contracts Awarded."

Constr. News page 216

CONTRACTS AWARDED

Ia., Sioux City — Lytle Constr. Co., C. F. Lytle, pres., 504 Nebraska St., 6 story, 60 x 150 ft., rein.-con., brick, incl. stores, 5th and Pierce Sts., day labor. $400,000.

La., New Orleans—Standard Oil Company of Louisiana, 2134 St. Charles Ave., 5 story, 50 x 120 ft., rein.-con., brick, concrete found., St. Charles Ave., to W. H. Williams, 833 Howard Ave. Est. $150,000.

Mich., Detroit—New Center Development Co. (Fisher Bros.), Fisher Bldg., excavation and foundation for 11 story, 105 x 196 x 285 ft., brick, stone, concrete, steel office, 2nd Blvd. and Lothrop Ave., to H. G. Christman Burke Co., Fisher Bldg. Noted Oct. 9.

Mo., Kansas City — J. A. Bruening, Dwight Bldg., 10 story, basement addition, 10th St. and Baltimore Ave., to S. Patti Constr. Co., 705 Finance Bldg. Est. $150,000.

Ont., Toronto — Bank of Nova Scotia, 39 King St. W., office, to G. A. Fuller Co. of Canada Ltd., 25 Adelaide St. E., Toronto, and 597 Madison Ave., New York. Est. $5,000,000. Noted Oct. 16.

STORES

PROPOSED WORK

N. J., Metuchen—P. G. Costa, c/o A. Merchant, archt., 1 Elm Row, 2 story, basement, brick, steel store, apartment. $150,000.

BIDS ASKED

N. J., Lyndhurst (br. Rutherford)—Owner, c/o P. J. Jossier, archt., 240 Broad Ave., Palisades Park, bids about Jan. 15, general contract 2 story, basement, 90 x 100 ft. stores, apartment. $150,000. Noted Sept. 25.

CONTRACTS AWARDED

Calif., Los Angeles — Westmoreland Building Corp. Ltd., Westmoreland Ave. and Wilshire Blvd., 2 story, 100 x 170 ft., concrete, brick, French Renaissance style, to R. E. Millsap, Pacific Natl. Bank Bldg., $150,000. Noted Oct. 30.

O., Cleveland—Cleveland Terminals Building Co., R. Sharpe, vice pres. and genl. mgr., electrical work for 12 story, 2 sub-basement department store, to Hatfield Electric Co., Terminal Tower, $350,000. Higbee Co., East 14th and Prospect Ave., lessee. Noted Oct. 30.

LOFTS

PROPOSED WORK

Ont., Toronto — R. J. Sapera, 197 Spadina Ave., plans by Kaplan & Sprachman, 305 Dundas St. W., 15 story, 70 x 100 ft. rein.-con. loft, Spadina Ave. and Oxley St. $350,000.

PUBLIC

PROPOSED WORK

Conn., Newtown — LIBRARY — Town, Town Clerk, Town Hall, C. H. Booth Library, $200,000. Architect not selected.

Mass., Newton—COURT HOUSE—Middlesex Co. Comm. Court House, plans by J. H. Ritchie & Associates, 250 Stuart St., Boston, 2 story, basement, brick, stone, concrete, steel district court house, plain found., Washington St. between Waltham and Cherry Sts. $150,000.

Mich., Detroit — LIBRARY — Public Library Comm., Library Bldg., Woodward Ave., plans by Smith, Hinchman & Grylls, 800 Marquette Bldg., 4 story, basement, brick, steel, rein.-con., plain found., Gratiot Ave. and Farmer St. $300,000.

N. J., Hackensack—HALL of RECORDS—Bd. Freeholders Bergen Co., Court House, bids late in December, 6 story, basement, brick, steel administration building, Main and Hudson Sts. $1,200,000. E. L. Tilton & W. F. Schwanewede, 420 Lexington Ave., New York, archts. Noted Oct. 16.

N. J., Paterson—HALL OF RECORDS, etc.—Bd. Freeholders Passaic Co., Court House, revised sketches by H. B. Crosby, 1st Natl. Bank Bldg., 20 story, basement, brick, steel hall of records, county detention jail, Grand St. between Spring and Jackson Sts. $3,500,000. Noted July 24 Daily.

N. Y., New York—OFFICE—Dpt. Sanitation, Municipal Bldg., bids in December, foundations for 10 story, 75 x 202 ft. office, Worth, Center and Leonard Sts. Total $5,000,000. C. B. Meyers, 31 Union Sq., archts. Noted Sept. 25.

Ont., Toronto — MUSEUM — Royal Ontario Museum, Bloor St., soon takes bids general contract 3 story, basement, 60 x 450 ft. rein.-con., stone addition. Excavation now under way by owners by day labor. $1,500,000. Chapman & Oxley, Sterling Tower, archts. Noted Oct. 9.

BIDS ASKED

La., Baton Rouge—CAPITOL—Dec. 10, by H. P. Long, gov., 33 story, marble, steel, limestone, brick, hollow tile, 5,000,000 cu.ft. floor space, Church St. between 3rd and 5th Sts., for State. $5,000,000. Weiss, Dreyfous & Seiferth, Maison Blanche Bldg., New Orleans, archts. Noted Nov. 13.

Mass., Fall River — FIRE STATION — City, Public Building Dpt., taking bids 2 story, 75 x 134 ft., brick, steel fire station, Bedford and Troy Sts. $150,000. E. M. Corbett, 167 Bedford St., archts. Noted Oct. 23.

N. Y., New York—FREIGHT TERMINAL—Port of New York Authority, 80-90 8th Ave., bids in December for demolition buildings and bids about Jan. 1, foundations and general contract 14 story, 200 x 800 ft., rein.-con., brick, 8th and 9th Aves. from 13th and 14th Sts. $9,000,000. Abbott, Merkt & Co., 175 5th Ave., archts. Noted Sept. 25.

Tex., Amarillo—COURT HOUSE—Dec. 11, by Clerk Potter Co., S. B. Motlow, judge, Court House, 8 story, 84 x 144 ft., rein.-con., Indiana limestone, 5th Ave., Fillmore and Taylor Sts. $420,000. Towner, Lightfoot & Funk, Johnson Bldg., archts. Noted Oct. 2.

CONTRACTS AWARDED

La., New Orleans — ALMS HOUSE — City Council, Touro-Shakespeare Alms House, 2 and 3 story, 197 x 204 ft., stucco, at Algiers, to Caldwell Bros. & Pond Bros., 816 Howard Ave., $252,295. Noted Sept. 18.

Mass., Billerica—HOUSE of CORRECTION—Middlesex Co., County Court House, 3 story, basement, brick, stone, steel house of correction, plain found., to C. S. Cunningham & Sons Constr. Co., Statler Bldg., Boston, $634,400; heating, ventilating also plumbing to T. J. Murphy Co., 8 Walden St., Cambridge, $114,000 and $71,840 respectively; electrical work, to M. B. Foster Electric Co., 415 Atlantic Ave., Boston, $57,740. Grand total $877,980. Noted Oct. 23.

Mass., Westboro — CHAPEL, etc. — Bd. Trustees, 41 Mt. Vernon St., 1 and 2 story, basement, brick, stone chapel, auditorium and assembly building, plain found., at Lyman School for Boys, to E. E. Munroe, 62 Spring St., Plainville. Est. $150,000. Noted Aug. 15.

BUILDINGS—UNCLASSIFIED

PROPOSED WORK

Ill., Rock Island—HOME—Bethany Home Bd., 3518 5th Ave., C. Bowers, supt., plans by E. Schulzke, 830 5th Avenue Bldg., Moline Childrens Home, 2 story, basement, rein.-con., brick, stone, on Rock Island-Moline Rd. $200,000.

Mass., Boston — STATION — Commonwealth of Massachusetts, Dpt. P. Utilities, State House, rapid transit station, Charles and Cambridge Sts., Cambridge Subway. $375,000. E. R. Stringer, Boston Transit Dpt., 1 Beacon St., engr.

Mass., Framingham—EXCHANGE—New England Telephone & Telegraph Co., 50 Oliver St., Boston, and R. C. Sturgis, archt., 120 Boylston St., Boston, 3 story, basement, brick, stone, concrete, steel, concrete found. Lexington Ave. and Union St. $150,000. Noted Oct. 23.

Mass., Worcester—FREIGHT TERMINAL—See "Warehouses."

Mo., St. Louis—EXCHANGE—Southwestern Bell Telephone Co., 11th and Pine Sts., bids early 1931, 2 story, basement, 100 x 130 ft., brick, stone, rein.-con., Eichelberger and January Sts. $850,000 incl. equipment. I. R. Timlin, 1916 Telephone Bldg., archt. Noted Oct. 23.

N. J., Passaic — EXCHANGE — New Jersey Bell Telephone Co., 540 Broad St., Newark, general contract brick, steel, Prospect St. Maturity in January. $150,000. Voorhees, Gmelin & Walker, 101 Park Ave., New York, archts. Noted May 8.

N. Y., New York—EXCHANGE—New York Telephone Co., 1775 Grand Concourse, bids late in December, general contract exchange, Trauman and Rowland Aves. $300,000. Voorhees, Gmelin & Walker, 101 Park Ave., archts. Noted Oct. 2.

O., Cincinnati — NEWSPAPER — Cincinnati Times Star, 6th and Walnut Sts., plans by S. Hannaford & Son, Dixie Terminal, 15 story, 2 basements, rein.-con., limestone, 8th and Bway. Sts. $1,800,000.

Va., Richmond — MEDICAL SCIENCE — L. Smith & V. Dervoort, archts., 6th and Franklin Sts., sketches Medical Science Building, 11 story brick, Indiana limestone, Franklin St. between Adams and Jefferson Sts. $575,000. Owners name withheld.

BIDS ASKED

N. Y., New York—MARKET—See "Contracts Awarded."

Wis., Sheboygan — PACKAGE FREIGHT TERMINAL, etc.—Nov. 24, by Milwaukee Electric Ry. & Light Co., 217 Michigan Ave., 1 and 2 story, 40 x 180 ft., brick, steel freight terminal, motor bus garage, F. Luber, c/o owner, archt.

CONTRACTS AWARDED

N. Y., New York—EXCHANGE—New York Telephone Co., 140 West St., general contract 17 story exchange, to Cauldwell Wingate, 101 Park Ave. Contractor awarded all separate contracts. Noted Sept. 25.

N. Y., New York—EXCHANGE—New York Telephone Co., 140 West St., exchange, to White Constr. Co., 95 Madison Ave. Est. $1,000,000. Noted Oct. 9.

N. Y., New York—MARKET—Philip Ohl, lessee, 846 Amsterdam Ave., 19 story, basement, penthouse 75 x 94 ft. market, stores, and apartment, 846 Amsterdam Ave., separate contracts. To exceed $500,000. N. Korn, 55 West 42nd St., New York, archt. Noted Oct. 30.

N. Y., New York—PUBLISHING PLANT—A. Kahn, archt., 229 West 43rd St., general contract 100 x 243 ft., publishing plant and printing addition, to Cauldwill Wingate Co., 101 Park Ave., for New York Times, 221 West 43rd St. Est. $600,000. Noted Sept. 18.

Tex., Fort Worth — PRODUCE MARKET — Texas Ice & Refrigerating Co., C. Goodfellow, 1 and 2 story, brick, to T. S. Byrne, Fort Worth Natl. Bank Bldg. Est. $150,000. Noted Aug. 15.

Buildings

FACTORIES AND MILLS

PROPOSED WORK

Conn., Waterbury—DAIRY—A. H. Merriman & Sons, Inc., 34 Englewood Ave., sketches by McCormick Co., South Negley Ave., Pittsburgh, Pa., brick, steel, Hamilton St. $50,000.

Me., Frankfort — CUTTING PLANT — Mt. Waldo Granite Co., Mt. Waldo, plans by Leo F. Caproni & Co., 1044 Chapel St., New Haven, Conn., 1 story, 55 x 250 ft., concrete, steel, corrugated asbestos siding, plain found. $45,000.

Md., Baltimore—PLANT—Caroline Fdry. Co., Caroline and Lancaster Sts., 3 story, 40 x 60 ft. addition for storage, etc.

Mo., St. Louis—VENEER FACTORY—Flexwood Co., 919 North Michigan Ave., Chicago, Ill., postponed indefinitely construction veneer manufacturing plant, 4000 Block on Clara Ave. $250,000. Noted Nov. 13.

N. J., South River—YACHT PLANT—Seawood Corp., A. Wood, in charge, 16 West 61st St., brick, steel, William St. and South River. $40,000 or more. Architect not selected.

N. Y., Long Island City—FACTORY—General Bronze Corp., 34-19 10th Ave., plant. $500,000-$1,000,000. **Maturity in January.**

N. Y., New York — MANUFACTURING — Attica Film Corp., 1501 Bway., revised plans by E. J. Kahn, 2 Park Ave., manufacturing, 521 West 43rd St. $550,000. Noted Oct. 9.

Ont., London—FACTORY—National Casket Co. Ltd., 107 Niagara St., Toronto, addition, $50,000.

Que., Loretteville — FACTORY — Stitchdown Ltd., E. Bastien, mgr., shoe factory at Chauteau d'Eau, near here. $50,000.

BIDS ASKED

Ariz., Yuma—PACKING PLANT—See "Contracts Awarded."

Calif., Oakland—FACTORY—C. N. Burrell, archt., Amer. Bank Bldg., taking bids 1 story, 12,000 sq.ft. floor space, concrete, 102nd Ave., for Hammer-Bray Co., 26th Ave. and East 12th St.

Calif., San Francisco — CREAMERY — D. Riedy, archt., Pacific Bldg., taking bids 2 story (ultimately 4 story) basement, rein.-con., 18th and York Sts., for Challenge Creamery Co., 307 Montgomery St.

Ind., Bloomington—STONE CUTTING PLANT—See "Contracts Awarded."

CONTRACTS AWARDED

Ariz., Yuma — PACKING PLANT — Yuma Bonded Warehouse Co., packing plant, warehouse building, day labor, $200,000. C. H. Trigg, Yuma, engr.

Ind., Bloomington—STONE CUTTING PLANT—Fluck Cut Stone Co., 1 story, 50 x 150 ft., brick, steel. $40,000. Owner builds. Abell-Howe Co., 20 North Wacker Dr., Chicago, Ill., engrs.

Ill., Galesburg—DAIRY—College City Milk Co., remodeling 2 story, basement, glazed tile, rein.-con. overall factory into dairy building, Mulberry and Chambers Sts., to E. A. Cholstran, 1479 North Seminary St. Est. $50,000-$75,000.

Ind., Washington—PLANT—Coca Cola Co., general contract 2 story, 50 x 100 ft., rein.-con., brick, steel, to Kretz & Zinkan, Washington. Est. $40,000. Noted Oct. 1.

Kan., Humboldt—GAS PUMPING STATION—Great Lakes Pipeline Co., 1 story, basement, brick, concrete, to D. C. Bass & Sons, Enid, Okla. Est. $40,000.

Kan., Independence — GAS PUMPING STATION—Great Lakes Pipeline Co., 1 story, basement, brick, concrete, to D. C. Bass & Sons, News Bldg., Enid, Okla. Est. $40,000.

Kan., Paola — GAS PUMPING STATION — Great Lakes Pipeline Co., 1 story, basement, brick, concrete, to D. C. Bass & Sons, Enid, Okla. Est. $40,000.

Kan., Wichita—ICE CREAM PLANT—Steffens Ice & Ice Cream Co., 1st Natl. Bank Bldg., 5 story, basement, 101 x 120 ft., rein.-con., brick, stone, terra cotta, Santa Fe and Rock Island Sts., to Armagost & Son, 3417 Edgmont Pl. Est. $300,000.

N. J., Bound Brook—FACTORY—Pathe Exchange, Inc., Middlesex Boro, general contract 1 story, basement, brick, steel, to M. C. Fredennick & Sons, Inc., 25 West 45th St., New York. Est. $40,000. Noted Oct. 30.

N. Y., Brooklyn — CARPET CLEANING PLANT — G. P. Brush, Lexington and Tompkins Aves., general contract carpet cleaning plant, to S. F. Musselwhite, 482 East 53rd St., New York. Est. $40,000. Noted Sept. 18.

N. Y., Long Island City—BAKERY—Sussman Bros., 547 Grand Ave., Astoria, bakery 25th Ave. and 45th St., to F. Benson, 2316 Bway., Astoria. Est. $40,000.

O., Columbiana—FACTORY—U. S. Standard Mfg. Co., 1 story, 60 x 105 ft., concrete block, steel, Railroad and Spruce Sts., to R. W. Heck, East Palestine, $33,000.

Pa., Emlenton — OIL CRACKING UNIT — Emlenton Refining Co., last unit oil cracking plant, to Universal Oil Products Co., 310 South Michigan Ave., Chicago, Ill., $250,000. Total est. $1,000,000. Contractor now taking bids on materials.

Pa., New Castle — STEEL PLANT — Blair Strip Steel Co., G. D. Blair, Jr., pres., 1 story, 50 x 250 ft., brick, steel, Butler Avenue Extension, to A. W. Bauman, 306 East Winter St.

Vt., Barre — CUTTING PLANT — Rock of Ages Corp., 1 story, 65 x 260 ft., steel, asbestos covering, plain found., to Leo F. Caproni & Co., 1044 Chapel St., New Haven, Conn. Est. $75,000.

Ont., Hamilton—PRINTING PLANT—Reid Press Ltd., 25 McNab St. S., general contract 1 story, basement, 146 x 231 ft., rein.-con., brick, steel, to Fred Constr. Co. Ltd., Terminal Bldg. Est. $75,000. Noted Oct. 23.

GARAGES

PROPOSED WORK

Mass., Arlington—Stuart-Marshall Realty Co., 825 Beacon St., Newton, plans by C. S. J. White, 825 Beacon St., Newton, and soon takes bids 1 story, concrete, steel, service garage addition, Broadway and Alton Sts. $40,000. Noted Nov. 13.

Mass., Charlestown (sta. Boston)—A. J. Wilson, c/o B. Brown, engr. and archt., 65 Franklin St., Boston, altering and constructing 1 story, 90x130 ft., brick, concrete, steel service garage addition, 39 Miller St. $40,000.

N. H., Conway—Conway Motor Car Co., F. Egan, rebuilding 1 story, concrete service garage and repair shop, recently destroyed by fire. $50,000. Architect not selected.

N. Y., Brooklyn—H. Goldin, 1539 East 16th St., sketches by J. J. Millman, 67 Court St., storage garage and service station, 16th Ave. and West 45th St. $85,000.

N. Y., Brooklyn—Lynkings Realty Co., W. Zorn, pres., 1366 White Plains Rd., New York, sketches by F. H. Klie, 250 Park Ave., New York, service garage, New Utrecht and 18th Aves. To exceed $70,000.

N. Y., Brooklyn—Morris Solomon, Morgan Ave. and Scholes St., sketches by B. Sockheim, 26 Court St., service garage, Morgan Ave. and Scholes St. $40,000.

N. Y., Brooklyn — One Thousand Four Hundred Eight Pitkin Avenue Corp., A. W. Norek, pres., 66 Court St., bids after Feb. 1, general and separate contracts service garage and stores, Pitkin and Eastern Parkways. H. J. Nurick, 66 Court St., archt.

N. Y., Brooklyn—D. H. Yeoman, 89-15 187th St., Hollis, service garage, 54th St. and 21st Ave. $50,000. **Maturity in February.** J. A. Boyle, 367 Fulton St., Brooklyn, archt. Noted Oct. 30.

CONTRACTS AWARDED

Me., Augusta — State Street Realty Co., 2 story, 120 x 130 ft., brick, steel service garage, concrete found., State St., to J. E. Roberts, 13 Dennett St., Portland. Est. $100,000.

Mass., Norwood—Jenney Mfg. Co., 291 1st St., South Boston, 1 story, concrete super service station, Railroad Ave. and Washington St., to J. N. Daniels, 27 Florence Ave. Est. $50,000.

Mich., Detroit—Firestone Tire & Rubber Co., South Main St., Akron, O., 4 story, basement, brick, steel, rein.-con. automobile tire service station and battery station, plain found., Trumbull Ave. and Vernor Hy., to Otto Misch Co., 159 East Columbia St. Est. $250,000.

N. J., Newark—Schwartz Bros., 263 Lafayette St., general contract 1 story, basement, 100 x 150 ft., brick, steel, garage, warehouse, Rome St., to Fatzler Co., Inc., 11 Hill St. Est. $150,000.

N. J., Plainfield — Pub. Serv. Co-Ordinated Transport, Terminal Bldg., Newark, general contract 1 story, basement, 100 x 170 ft., brick, steel garage addition, to Shore Constr. Co., 94 Christie St. Est. $150,000. Noted Oct. 23.

SHOPS AND FOUNDRIES

PROPOSED WORK

Calif., Oakland — MACHINE SHOP and BRASS FOUNDRY—F. L. de Sanno, 4337 East 10th St., 1 story, 90 x 110 ft., steel, brick, tile, Peralta and 18th Sts.

Md., Baltimore—MACHINE SHOP, etc.—Lloyd E. Mitchell, Inc., 915 East Monument St., 2 story, 54 x 140 ft. machine shop, plant, Cecil Ave. and 25th St.

N. H., Concord—SHOPS—Boston & Maine R.R., W. J. Backes, ch. engr., Boston, Mass., heavy repair shops additions. To exceed $40,000.

Texas—MACHINE SHOPS, etc.—See "Railways."

CONTRACTS AWARDED

N. J., New Brunswick — SHOP, etc. — S. Deutsch, 249 Nelson St., general contract 2 story, basement, brick, steel shop, store, 226 Nelson St., to B. Shiff, Lincoln Ave., Highland Park. Est. $40,000.

See proposal advertising on page 98

POWER PLANTS

PROPOSED WORK

Conn., Wallingford — Connecticut Light & Power Co., Borough Electric Works, substation and high tension line from South Manchester $85,000. Private plans.

N. Y., New York—Dpt. Hospitals, Municipal Bldg., bids late in December, general contract power plant, at Harlem Hospital, 58 West 137th St., $330,000. Sloan & Robertson, 420 Lexington Ave., archts. Noted Feb. 20.

Okla., Cleveland — City sketches municipal electric light and power plant. $75,000. A. Page, city clk. Private plans.

Okla., Nowata—City electric light and power plant. $100,000.

Okla., Vinita—City sketches municipal light and power plant. $240,000. Russell & Axon, 6200 Easton Ave., St. Louis, Mo., and McDaniel Bldg., Springfield, Mo., engrs.

Tex., Dallas — Dallas Power & Light Co., Interurban Bldg., preparing plans (1st unit) 35,000 kw. power plant at Mountain Creek, near here. $3,000,000. Completed plant will provide 120,000 kw. power, which will be transmitted from Mountain Creek plant over steel tower lines to here. Noted June 5.

Wis., Milwaukee — Amer. Candy Co., 215 Bway., rehabilitation power plant and manufacturing plant electrical and mechanical equipment. O. H. Henschel, 401 Commerce St., consult. engr.

Wis., Milwaukee—Federal Pressed Steel Corp. of Milwaukee, power plant, incl. stoker fired high pressure boilers, electrical generating equipment. O. H. Henschel, 401 Commerce Bldg., consult. engr.

BIDS ASKED

N. Y., Poughkeepsie — Dec. 10, by Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, construction work for repairs to boiler house, Hudson River State Hospital.

Tex., Baytown—See "Contracts Awarded."

CONTRACTS AWARDED

Mich., Detroit — J. S. Foley, secy. Public Lighting Comn., Atwater St., Woodward Terminal and Philip Ave. electric sub-stations, to H. G. Christman Burke Co., Fisher Bldg., $81,900. Noted Aug. 14.

N. J., Trenton—Bd. City Comrs., City Hall, general contract 3 story, basement, brick, steel power house addition, laundry and tunnels, to Auf Der Heide Contg. Co., 443 16th St., West New York. $302,500. Noted Oct. 23.

Pa., Pittsburgh — Duquesne Light Co., 435 6th Ave., brick sub-station, Main and Homley Sts., to Byllsby Eng. & Management Corp., 435 6th Ave.

Pa., Tarentum—See "Waterworks."

Tex., Baytown—Humble Oil & Refining Co., Humble, and Humble Bldg., Houston, 74 x 175 ft., brick, tile, steel power plant, day labor, $110,000. Jackson & Moreland, 31 St. James Ave., Boston, Mass., engrs.

Alta., Lethbridge—City, supplying, installing two new 500 hp. Stirling type boilers, superheaters and economizers for new municipal power plant, to Electric Power Equipment Ltd., Vancouver, B. C., F. J. Bartholomew, pres.

WAREHOUSES

PROPOSED WORK

Mass., Worcester — Northeastern Storage & Distributing Corp., 93 Grafton St., plans by J. Rice & F. B. Hoffman, 147 East 51st St., New York, warehouse and freight terminal, Grafton St. and Keefe Pl. $1,000,000. Noted Oct. 23.

BIDS ASKED

Calif., San Francisco—H. G. Baumann, archt., 251 Kearny St., taking bids 3 story, rein.-con., Sansome and Vallejo Sts., for Poultry Producers of Central California, 700 Front St. $150,000.

CONTRACTS AWARDED

Calif., San Francisco—S. J. Hester, secy. Bd. P. Wks., general contract (1st unit) 2 story, rein.-con. warehouse, to Mahony Bros., Flood Bldg., $73,450. Noted Oct. 23.

Ill., Galesburg—Standard Oil Co. of Indiana, Peoria, 1 and 2 story, basement, irregular sized, rein.-con., brick warehouse and office buildings, plain founds., Knox St., to R. Iben Contg. Co., Peoria. Est. $100,000.

Mass., Braintree — Town, Municipal Light Dpt., Quincy Ave., East Braintree, 1 story, concrete storehouse, to C. C. Temple Co., 99 Chauncy St., Boston. Noted Nov. 13.

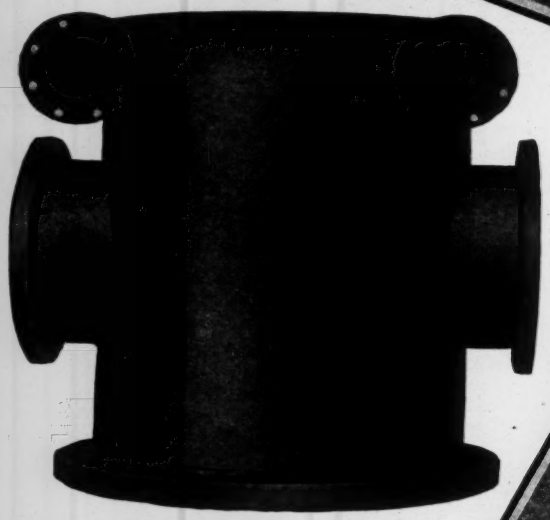
Miss., Jackson — Virginia-Carolina Chemical Co., Richmond, Va., chemical storage warehouse, to Meers & Wallenka, 63 South 3rd St., Memphis, Tenn. Est. $40,000.

Miss., Jackson — Virginia-Carolina Chemical Co., Richmond, Va., warehouse and chemical storage, to Meers & Wallenka, 63 South 3rd St. Est. $40,000.

N. Y., New York—Six Hundred Thirty West 54th Street Corp., M. Natanson, pres., 522 5th Ave., warehouse, industrial, 630 West 55th St., to G. Richard Davis, 12 East 41st St. Est. $500,000. G. B. Seeley Son, 319 West 15th St., lessee.

Wis., Milwaukee — Terminal Warehouse Co., 106 Seeboth St., pile driving for 5 story, 62 x 120 ft., brick, concrete addition, to E. E. Gillen, East Water St.

Constr. News page 217



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